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[ILLUSTRATED.]

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New Apparatus of the Detroit Electrical Works.

The improvement that is constantly going on in electrical appliances is well shown by the work that the above company is sending out. In Fig. 1 of this article we illustrate their new and improved hotel annunciator, which is meeting with much favor. The apparatus consists of the regular annunciator, as shown, with return bells, or guest calls added. In setting up the system, only one wire is employed between annunciator and guest's room, thus reducing the cost and lessening the liability of getting out of repair. A little contrivance is placed in the push button which does away with the extra wire. A fire-alarm attachment is added to the annunciator when desired; and with this arrangement a general alarm can be given throughout the house, by turning a switch and pressing the button marked fire, thus effectually warning guests of impending danger. The company claims simplicity, durability and effectiveness for this system.

Fig. 2 represents a new dining-room table button, with floor attachment. By this arrangement the button can be shifted to any part of the table desired, and obviates the difficulty which is so often met with—that is, having the key-spring displaced and lost by children. Fig. 3 illustrates the improved power generator that this company is introducing, wherever there is a demand for them.

An Interesting Paper on Radiation.

BY DR. FREDERICK SIEMENS.

Radiation plays a much greater part in all heating operations than has been hitherto acknowledged; consequently, any cause which tends to lessen the radiating power of flame, or to screen its rays, reduces also the amount of heat which can be thus utilized.

Adopting the generally-accepted theory of combustion, according to which a flame consists of a chemically-excited mixture of gases whose particles are in violent motion, either oscillating to and from each other or rotating around one another, it follows that any solid substance brought into contact with gases thus agitated must necessarily have an impeding effect on their motion.

Motion being the primary condition of combustion, the latter will be more or less interfered with, according to the greater or less extent of the surfaces which impede the action of the particles forming the flame. In the immediate neighborhood of such surfaces the combustion of the gases will cease altogether, because the attractive influence of the surfaces will entirely prevent their motion; further off their combustion will be partial, and only at a comparatively great distance the particles of gas will be free to continue unimpeded the motion required to maintain combustion. On the other hand, the surfaces themselves must suffer from the motion of the particles of gas producing the flame, for, however small these particles may be, they produce, while in such violent motion, an amount of energy which, acting constantly, will in time destroy the surfaces opposed to them, just as "continual dropping wears away stone." This circumstance fully accounts for the fact that the inner sides of furnaces, and the materials they contain, are soon destroyed, not by heat, but by the mechanical, and perhaps also by the chemical, action of the flame. It would seem strange that the heating power of a large volume of flame should be so much interfered with by the contact of its outer parts only with the inner sides of a large furnace chamber, if there was not another cause besides imperfect combustion to reduce the heating effect of a flame, which touches the surfaces to be heated. A flame when in the state of combustion radiates heat, not only from its outer surface, but also from its interior, by allowing the heat to radiate through its mass. In this manner every particle of flame sends its rays in all directions; but if the flame itself touches anywhere, combustion ceases there, free carbon is liberated and produces smoke, which envelopes that part and prevents the rays of heat of the other portions of the flame from reaching it.

If the flame is not allowed to come into contact with bodies to be heated, combustion is improved, while full advantage is also gained of its heat-radiating power, which would otherwise be diminished more or less, as already explained. The ordinary mode of applying flame, by allowing it to impinge directly upon the surfaces to be heated, causes imperfect combustion, prevents the rays of heat from reaching them, and also destroys, or tends to destroy, them. This is particularly the case when hydro-carbons and carbonic oxide are used.

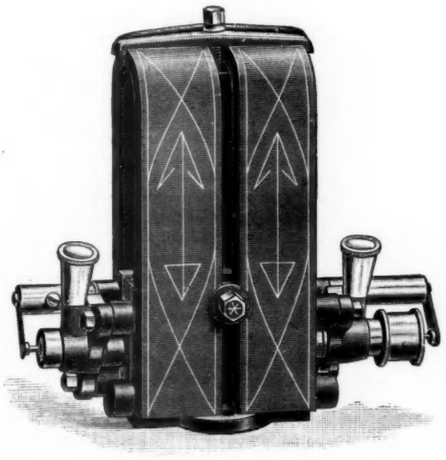


FIG. 3.—POWER GENERATOR.

FIG. 1.—HOTEL ANNUNCIATOR OF DETROIT ELECTRICAL WORKS.

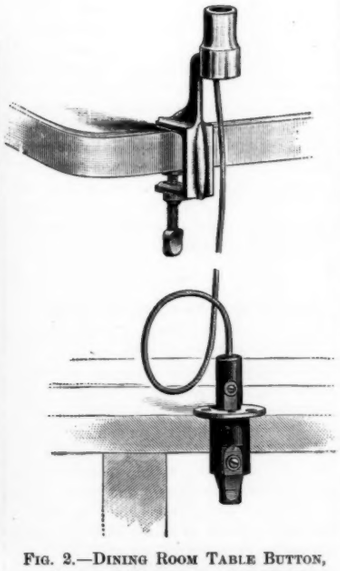


FIG. 2.—DINING ROOM TABLE BUTTON, SHOWING METHOD OF ATTACHING.

A New Electric Engine for Street Cars.

A new electric tram engine was shown recently at the station of the North Metropolitan Tramway Company, Stratford, England. This is a center at which fair trials have always been accorded to any new motor, and it is understood that in the event of the new inventors and the tramway company agreeing upon terms, a practical experiment of no small importance will be made in electric tramways up on the new line to Ilford. The electrical engineers in this case are the Electric Locomotive and Power Company (limited), who claim to have solved the problem of economical working by combining the electrical power with the mechanical aid of the lever principle. The electro-motor is connected by pinions horizontally with a large stationary rack and vertically with the wheels. When the electrical engine is started the pinion of the horizontal armature gears into the stationary rack, and so causes the motor itself to revolve. The motor then becomes, by the action of its fixed vertical shaft, the driving axle and communicates its motion to the wheels of the car. By means of clutches a backward or forward motion can be secured without reversing the direction in which the electro-motor is revolving. The electricity is supplied from fifty cells of, say, a total of 280 amperes. It is claimed that the average discharge is from 40 to 45 amperes per hour, and that an engine consuming only two tons of coal per week, will charge batteries sufficient to do the work of four cars requiring at present 44 horses per week. The engine appears to be controlled with perfect ease, and though at present it is fitted up separately from the car itself, so as to take the place of horses and utilize existing cars, the company claims that it can in future easily be constructed as a part of the passenger car.

The Police Telephone System of Brooklyn.

The City of Churches has been making considerable progress of late in the direction of furnishing quick transmission of intelligence between its various police departments and offices. While New York is still struggling with the slow-going dial system, Brooklyn is sending five or even ten messages to one by its thorough and complete telephone system. The advantages of the telephone system are as many as great. Brooklyn has found it successful, and nearly every day adds something to the already large stock of knowledge gained by the department by practical experience with the system.

Six years ago the telephone was put into general use by the Police Department for the transmission of messages. Previous to that there had been half a dozen stations connected with headquarters by telephone, but they had first to call up headquarters on the dial and notify the operator to go to the telephone before they could use the latter instrument. In 1880 every precinct was connected by telephone, and under far different circumstances than those prevailing when the first connection was made. At present there is a switchboard made in the telephone room at headquarters, into which fifty different wires can run. The lines running into this switchboard are

not only those of the police, but of every city department having any connection whatever with that department. By the use of plugs any line running into the switchboard can be connected with any other line running into it. More than that, there is a wire running to the Central Telephone Office, and any police station can be connected by means of this switchboard with any person who is on the telephone, no matter where.

One station can be switched on to another, or can be put into Jersey City, Hoboken, Trenton or Sing Sing, if necessary. Communication is frequent between Brooklyn Police Headquarters and Sing Sing Prison about prisoners that were to be sent to the latter place from this city.

Since Mr. F. C. Mason became superintendent of police telegraphing in Brooklyn, there have been many improvements introduced even on what was thought then to be a perfect system. There has been a black walnut addition built to each end of the switchboard, so that if it should ever become necessary to have more than fifty lines, other switchboards could be put in. Besides that, instead of having each wire run into the Municipal Building separately, they are in a cable and only separated when they reach the telephone room. There is a numbered drop for each wire, and before the wires reach the switchboard they run through a lightning arrester. Mason has also introduced a galvanometer, and vexatious delays are often saved by prompt testing.

In addition to the telephone lines, there is still a telegraphic line to each station at the city from headquarters, with dial attachment, and each telephone line can be plugged into the dial from headquarters. More than that, where a line, in running to one station passes another, it is looped so that it can be used by the latter if necessary, and these stations thereby have three wires to use, and it is next to impossible that all can be out of order at one time. The telephone will also be used in the booth or police box system, which will be in operation in Brooklyn in a few weeks. People who are not interested in and do not understand police business can hardly give the proper value to the telegraph or telephone branch of the service. An idea of the volume of business can be found when it is stated that during 1885 the operators at headquarters sent and received 267,530 messages. They were sent, to some extent, for other departments than the police, and also received for them. The following is a classification: Department of City Works, 7,979; Department of Health, 1,735; Department of Fire, 728; coroner, 3,960; ambulance calls, 4,153; lost children reported, 2,940; missing persons reported, 2,328; stray animals reported, 1,506; dead animals reported, 8,840; through Central Office Tel. Company, 9,753; miscellaneous, 163,608. Total 207,530.

Superintendent Mason estimates that already this year 150,000 messages have been sent and received, and that the total for twelve months will largely exceed that of last year. Commissioner Carroll has fitted up the telephone room with all needed appliances and made it comfortable, which it was not before. This branch of police business is about as near perfect as it can be.

* * A Leadville dispatch says: "George S. Edwards, who was struck by lightning while crossing Iron Hill, on the 4th instant, is slowly recovering. His case is a most remarkable one, and is attracting considerable attention from scientific men. Edwards, after the flash, lay unconscious for fifteen minutes before receiving assistance. The lightning struck him on the left cheek, knocking out a number of his teeth. It then passed diagonally across the breast to the right side, thence to the feet, coming out of the right boot, having passed through the foot and leaving a hole very similar to that made by a bullet. The clothing was torn into fragments, particles being found at a distance of 200 feet from the spot, while one of the boots, both of which were torn into shreds, was found 60 feet away. Immediately under where the man was standing the ground was torn up for a considerable distance. The lightning's course along the man's body is shown by a black and reddish streak one and a half inches wide, the worst effect being on the lungs, the immediate result being a severe hemorrhage by which a quart of blood was lost. In addition to these injuries, the surface of his body is almost completely covered with blisters, the result of severe burns. This is the first authenticated record of a person being injured by a stroke of lightning at an altitude of over 10,500 feet, and where a person injured internally, as Mr. Edwards was, was not instantly killed."

Chemistry Without Apparatus.

When one is engaged in qualitative chemical analysis, it is necessary to change vessels at almost every reaction, or else be compelled to resort to frequent washing, which, if it be not properly performed may spoil the results of the subsequent reaction. One of the best means that has been tried of getting over this difficulty consists in the use of the smoked capsules proposed by Mr. Violette. By smoked capsule is meant a small porcelain saucer covered with a layer of lamp-black by putting it into the flame of a candle. A drop of water or of a saline solution, carefully deposited in this capsule, assumes therein the form of a globule, which is as limpid as crystal, and which does not adhere to the lamp-black. The addition to this globule of another drop of saline solution or a particle of a solid reagent produces therein all the phenomena of coloration, precipitation, and crystallization with perfect clearness. The eye is capable of following in it the least changes (which are rendered still more manifest through the lenticular magnification) without having to look through the glass sides of what are usually used as receptacles.

After the phenomenon has been observed, the globule is thrown out through a slight blow on the capsule. The latter will be found clean, without residuum, and perfectly fitted for the examination of another reaction without any mixture with the preceding. The vessel is, so to speak, clean without the necessity of cleaning it, and there need be no fear of any of those contaminations, even slight ones, that sometimes spoil analytical results in the ordinary vessels used.

The capsule, which is only three-quarters of an inch in diameter, is nothing else than one of those small porcelain saucers used for water colors. In order to put it into the flame, it must be grasped with pincers; but the operation may be more easily performed by gluing a thin cork disk to it, and sticking a pin into this for a handle. For smoking one of these capsules properly it is necessary to use precaution. It should be thrust into the upper third of the flame of a candle several times, and be allowed to cool in the intervals. It is necessary to wait until the capsule is cold before depositing the globule in it, for otherwise it would get wet. The carbonaceous coating is at once made wet by acid, alcoholic, and ethereal liquids, and it is only aqueous solutions that assume a globular form upon it.

This mode of operating may be still further simplified by taking advantage of the property that the leaves of the same plants possess of not being wet by water and aqueous saline solutions. Among such leaves those of the nasturtium (*Tropœlum*) have a form that especially adapts them to this use. When one of these is held by its petiole, its upper surface exhibits a depression in which one can easily deposit a globule, and proceed exactly as with the smoked capsule. When the leaf becomes wet, after a few reactions, nothing is easier than to substitute another one for it.—*La Nature.*

An Electric Toothache Remedy.

A correspondent of Goodall's *Sun* says:

I always did have a scientific turn. So does the implement which imparts the circular motion to a grindstone, though I am unable to say which is the greater success as a crank. Among other symptoms of genius which are rapidly developing in me, I occasionally wrap myself in impenetrable gloom and other wearing apparel and wrestle with a redundant and conspicuous toothache. Having deposited so many incisors, biceps and molars with gentlemen of leisure who made a business of collecting such bric-a-brac, I began to fear that I should soon be compelled to live on codfish balls and mush the remainder of my days. What wonder, then, that the following from the London *Electrician* attracted my attention: "If a thin plate of zinc be placed on one side of the gum and a silver coin on the other side, with the aching tooth between them, and then the edges of the metals brought together, a weak galvanic current will be established that will cure the pain."

I immediately gathered up my wife's washboard, and cut a piece of zinc from it. She made a vigorous protest, but when a man has a tooth in his mouth that is dissatisfied with the management of affairs, his other troubles are as naught. After obtaining the zinc the next thing was to get the coin. A thorough investigation of my assets failed to reveal even a ten-cent piece, so I went out and borrowed that amount from a friend. In my hurry I laid the piece of zinc where I could not find it again. I cut another piece from the crippled washboard, the tooth rigidly adhering to the ache business, and my wife protesting; but something had to be done, and that something I heroically attempted to do.

Placing the zinc and coin as directed, I let them touch below the tooth. Jeminy crickets! A thousand toothaches at once! It was over in a second, and the tooth no longer ached; but the dime—oh, where was he? Half way down my throat and marching on. I had promised to return the dime in half an hour, but under the circumstances it was impossible, and my friend now regards me as a fraud. Hang those new-fangled remedies, anyhow!

Base Ball by Electricity.

Two years ago, nearly, three Yankee-like telegraph operators, living in Nashville, Tenn., turned their enthusiasm for base ball to good account. Their names are J. U. Rust, E. W. Morgan and A. H. Stewart, and they conceived the idea of reproducing almost instantly a vivid view of the exact situations and plays in a game of base ball, played in Chattanooga for instance, before an audience seated in a hall in Nashville To do this they leased a wire from Nashville to Chattanooga, one end of which was on the ball field with an expert operator, who was also accurately informed in base ball playing, seated watching the game and immediately telegraphing each play as it progressed. At the Nashville end of the wire were two other telegraphic and base ball experts. As they received the record from their partner one man reproduced it verbally to the audience while the other man manipulated cards bearing the names of the players, around a painted view of the ball field which was placed in full view of the audience.

During a recent game in Detroit, Morgan & Co., the name of the ingenious firm, presented their unique entertainment before a crowd of 600 persons in the Detroit Opera House, who had come to watch the progress of the Detroit Chicago game. On the stage was a huge landscape—it would have done well as a drop-curtain—having a well painted perspective view of a base ball diamond and outfield At the points on the picture representing the positions of batsman, pitcher, catcher and basemen, are openings into which may be shoved cards bearing the names of players, and into which these names are placed as the telegraph operator seated at his instrument reads to the audience the progress of the game, even to the smallest details.

Next to an actual view of a game of base ball, and indeed very close to such a view, in interest, is the witnessing of such a presentation of a game. Says the *Free Press:* The audience during the first four or five innings of yesterday's game was wrought up to a very high pitch of enthusiasm. For instance when the operator read—with Dalrymple's name appearing as batsman—"foul fly to left," the audience fairly held its breath, and when the next instant the operator called out, "and out to White," there came a storm of applause, just such as is heard on a veritable ball field. And so it was all through the calling of strikes, balls, long hits and short ones, outs, errors and "safes," the excitement was intense.

—— The Board of Public Works, of Oswego, N. H., have made a contract with the Home Electric Light Company for three years at $125 a light each year, and the extended lamp district will be soon be illuminated with electricity. The extension requires the outlay of $20,000 by the company and work will be begun immediately.

Arranging for Burying the Wires in New York City.

The Electric Subway Commissioners met last week. All three of the commissioners, their counsel, D. L. Gibbons, and Engineer Thomson were present. The engineer presented a report as to the capacity of the conduit required, and also as to the general plan of burying the wires. They are to be laid eighteen inches below the sidewalk in a conduit of solid asphaltum, with the drawing-in-and-out system, for which purpose there will be hand-holes every block. There will be a solid foundation underneath of beton. The details of the plan have not yet been fully determined. The Commissioners adopted the following resolutions:

Resolved, That the reports made this day by the engineers and counsel of this commission be laid upon the table for reference in providing for the details of the plan of the commission, as they are required to be provided for.

Resolved, That all currents of great intensity should be separated from all other currents, and that conductors of power, and those used in arc lighting, should be placed, wherever practical, in a conduit by themselves, subject to such regulations as may from time to time seem advisable to the commissioners.

Resolved, That currents of light intensity should be separated from all other currents, and that the telegraph, telephone, ticker, messenger and fire-call wires, and all those of that class, may, wherever practical, be placed together in the same conduit, subject to such regulations as may from time to time seem advisable to the commission.

Resolved, That incandescent lighting wires should be provided for separately from all other wires, and be placed, wherever practical, in a conduit by themselves, subject to such regulations as may from time to time seem advisable to the commission.

Resolved, That the commission hereby invite all companies and persons in the city of New York using electrical conductors to submit estimates of the number and kind of conductors they will respectively require in an underground system in the several streets and highways of the city, and as to all other matters relating to their respective service, to submit such practical suggestions as to the elaboration of the general plan of the commission, not at variance with said general plan, as they may desire to submit, for the information and consideration of the commission; the same to be submitted within ten days from the receipt by said companies of copies of this resolution, which the Secretary is hereby requested and directed to communicate to them without delay.

Resolved, That the plan of contract submitted to the commission for their approval by the counsel of the commission, and which their counsel has advised them will be approved by the Attorney-General of the State, be, and the same is hereby made, subject to such approval by the Attorney-General, the contract which the commission is ready and desirous to make with any properly organized corporation which may be willing to sign said agreement to act as agent of the commission for the laying, maintaining and operating of the subway.

Resolved, That, whereas, several propositions have been made and others will undoubtedly be made, to this commission by parties desirous of acting as agents of the commission in the performance of this work, and whereas it is proper for the commission to provide for a consideration of all such proposition, to the end that they may be informed as to which of the parties making such propositions is best able to carry out the said work, to furnish sufficient security for the carrying out of the proposed contract, all such propositions, together with all such as shall be made to the commission previous to their next meeting, shall be referred to the council of the commission, who shall report at said next meeting as to such proposals and which of said proposals is in his opinion the best for the commission to accept with the reasons therefor.

Resolved, That the counsel of the commission be authorized to obtain the official approval of the Attorney-General of the contracts submitted to the commission in the manner in which the Attorney-General has signified his intention to so approve it.

Resolved, That the engineers of the commission be directed to continue their investigations of the manner in which the plan of the commission should be elaborated for each of the separate services and localities of the city, and to report such facts and data as they may collect from time to time generally.

Resolved, That the engineers of the commission be directed to submit to the commission as soon as possible accurate specifications proper to be furnished to such constructing company as may become the agent of the commission for the carrying out of the work of the length, size, capacity, etc.

of an asphalt drawing-in-and-out conduit to carry all the telephone, telegraph, etc., wires required in the localities and districts of the city where the commission have decided to begin the work of construction of subways, viz., from Twenty-third to Fifty-ninth street, river to river, and also on One Hundred and Twenty-fifth street from river to river.

The report which was presented by D. L. Gibbons, counsel to the commission, is accompanied by a form of contract to be made with the construction company which may secure the right to construct the conduit for the underground wires. In his report Mr. Gibbons claimed that the commission is authorized by law to make a contract for burying the wires with an independent corporation organized for that purpose, and quoted numerous authorities to sustain his position. By the law under which the commission was formed, the board, he said, was given full authority to compel all companies operating electric wires to use the subway prepared in accordance with the provisions of the act. The construction company would have power, under the laws of the State, to build and maintain a subway, and to lease space in it to the different companies, and would also have power to borrow money and issue bonds under the restriction of the act of 1875, which provides that the amount of bonds outstanding at any single time shall not exceed one-half of the corporate property of the corporation.

The form of contract prepared by Mr. Gibbons, to be signed by the commission and the officers of the construction company, provides that the company shall build and maintain the subways in accordance with the plans of the board, and shall have the management and rental of the spaces therein subject at all times to revision, alteration, amendment, and reversal by the commission and its successors. Regular books shall be kept by the company, giving account of the amount of space rented in the subway, with the names of the persons renting it, the gross and net amount of rental paid for the space, and all expenditures and outlay of every kind, which books shall be at all times open to the inspection of the board and its successors. The subways are to be constructed in accordance with plans and specifications furnished by the commission, and space must be leased to any authorized electrical company operating wires in this city which may apply for it, but no space not actually needed for its business shall be rented to any company to the exclusion or detriment of any other company needing space; and all space needed for the electrical conductors of the city and its departments shall be furnished free of charge.

The rent for the use of the subway to be collected from any company shall not exceed the present cost to the company of maintaining its conductors overhead, and rentals shall be at the same rate to all occupants. Whenever the net rentals, after paying all charges and expenses, shall exceed 10 per cent. of the value of the capital invested, the excess shall be paid one-third to the city, one third to the companies occupying the subways, and one-third to the construction company. The companies are to own and manage their conductors, and in case of any dispute between them and the subway company, the commission is to be the final arbitrator. A bond of $500,000 is to be given by the construction company to secure the performance of the contract and to secure the commission and its successors against any patent or other suits arising from the building and maintaining of the subway. The bond is also to be a guarantee to the city for all damage by reason of the building of the subways and against any injury to pavements or other property. If at any time the subway company fails in the performance of its duty under the contract the commission reserves the right to take possession of the work and make such disposition of it as may be lawful.

At the second meeting of the Commission last week, the commissioners first listened to the report of their counsel, Daniel L. Gibbons, on the standing and responsibility of five construction companies that had offered to agree to the commissioners' specifications, whatever they may be, when published. Mr. Gibbons said, in substance, that all the organizations submitted to him seemed to possess the necessary qualifications as to financial responsibility. The five companies considered were the Consolidated Telegraph and Electric Subway Co., Averill Electrical Co., D. H. Dorsett Patent Subway Co., North American Telegraph and Electric Co., and the York Electric Lines Co. The reading of the counsel's report was followed by a general discussion, ending in its acceptance.

The following resolution was then adopted unanimously:

Resolved, That the Commission hereby accept the proposal of the Consolidated Telegraph and Electrical Subway Company, provided that the said company present to the Commission an indemnity of $500,000, with sureties to the satisfaction of the Commission; that said company present to the Commission such papers as they have covering the patents under which they claim they can do business, and they are satisfactory; that said company furnish accurate and satisfactory information as to the time at which they will be ready to begin work, and the rapidity with which they can carry it on, and that said company express specifically to the Commission its willingness to accept the contract adopted by the Commission and approved by the Attorney-General.

A telegram from Attorney-General O'Brien, announcing his approval of the form of contract to be entered into by the Construction Company, and the commission, was received and read at the meeting. The list of corporators of the newly-accepted company includes several well-known New Yorkers. Henry Fitzhugh, the president, is also president of the Equitable Gas Light Company, of Chicago, and a member of the Union Club of this city; Henry J. Davison, the vice-president, is a practical engineer of long standing in this city. His office, No. 30 Broad street, is also the office of the Consolidated Subway Company; Ewald Balthazar is a member of the banking firm of Hallgarten & Co., of this city; James B. Houston, another corporator, is president of the Pacific Mail Steamship Company, and Frank L. Freeman is a practising attorney in Washington. Edward Lauterbach is the counsel.

—— Members of the local gas company and several of the manufacturers at Easthampton, Mass., are considering the advisability of putting in an electric light plant for the mills. It will take 1300 lights for the field under consideration.

—— A very interesting application of the electric incandescent light to mining operations recently took place at Lord Vernon's Poynton and Worth Colliery, near Stockport. It appears that the lower pump-rod of the main pumping shaft of the Lady Pit, by which the pits are drained, broke, leaving the bucket in the bottom, some 600 feet below, and submerged in water. To remedy the rupture, divers were employed from the firm of Siebe, Gorman & Co., the well-known submarine engineers of Westminister, and their operations were carried on by the light of a Siebe diver's electric lantern worked by Thame's primary battery. The barrel of the shaft was disjointed and pulled up, and the pump-rod was repaired by this means. The Siebe lantern is a strong appliance, and weighs some 88 pounds out of water. It consists of an iron cover, permitting the conductors to pass inside to a cluster of four incandescent lamps, the light of which is reflected downward by a white reflector in the roof. A stout glass globe encircles these, and is protected from injury by iron prongs around it. Fifteen cells of Thame's primary battery were employed, and the total light obtained was about 80 candles, a luminous sphere of some six feet in radius being obtained under water.

Circular Relating to Mutual Insurance of Electric Lighting Stations.

The following is a copy of the circular sent out to every electric lighting station in New England, New York, New Jersey, Pennsylvania, Delaware and Maryland, and the nature of the replies will determine the course to be taken:

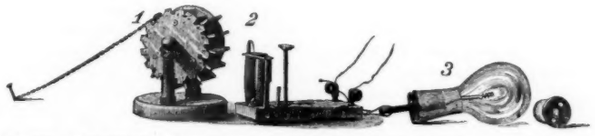
BOWDOIN BUILDING,
BOSTON, MASS., July 15, 1886.

GENTLEMEN—At the meeting of the National Electric Light Association in Baltimore, last February, the question of the organization of an Electric Mutual Insurance Company for the insurance of electric lighting stations, and, perhaps, kindred industries, received a full discussion, and the following resolution was adopted:

Resolved, That the Association endorses the plan of an organization of a Mutual "Electric Light Insurance Company."

At the convention of the Edison Illuminating Companies, held at Atlantic City, N. J., June 9, this matter was considered, and received general approval from the various local companies represented at the Convention.

The proposition involves the formation of a mutual insurance company, managed by a board of directors, elected by the representatives of the properties insured; that is, the electric interests form and control the company carrying their insurance, on the same basis as that followed by the Factory Mutual Insurance Companies of New England, with great success, for the past fifty years. These companies now insure over $400,000,000 upon industrial property in the New England States, New York, New Jersey, Pennsylvania, Delaware and Maryland.



MOTOR TELEGRAPH INSTRUMENT AND INCANDESCENT LAMP OF A. G. NYE.

Their policy has been conservative, always confining their insurance to first-class works, of good construction, and equipped with careful precautions against fire, both in regard to apparatus and care of the buildings. The result of this, as shown by the average of the annual reports of these companies for the year 1885, has been that a class of manufacturing property ordinarily classed as hazardous, is insured at a cost of 15 cents on the $100, or a little over one-seventh of one per cent per annum.

Since the meeting of the National Electric Light Association this matter has received constant attention. Surveys have been made of a number of electric illuminating stations; by conference and correspondence it has been brought to the consideration of the leading parent companies, and by them heartily endorsed, as any reduction of the cost of insurance will conduce to the prosperity of the illuminating companies, by diminishing what is now a fixed charge in the production of light.

The organization of such company cannot be undertaken, except on a sound and broadly conservative basis, such as can only be furnished by an amount of insurance ample enough to reduce the percentage of expense of administration to a small ratio of the premiums, and so widely distributed that it could not be disturbed by any unusual concentration of losses.

The cost of insurance in the proposed company will be the fire losses and the expense of conducting the company, without any expense for commissions, advertising, or any of those items which are such a burden on the stock insurance business, as carried on at the present day; and it is safe to assume that losses in a company controlled by the electric interests themselves, would be adjusted in the most fair and equitable manner possible.

As it has not been feasible to visit all of the electric lighting stations in the district covered by the Factory Mutual Insurance companies which have been selected for a beginning, will you, at your earliest convenience, please fill out the enclosed blank, in order that a summary can be made and submitted, with a plan of operations, if advisable, at the next meeting of the National Electric Light Association.

Please direct correspondence on the subject to C. J. H. Woodbury, P. O. Box 2020, Boston, Mass.

Very respectfully,

F. A. GILBERT,
Vice-President Merchants Electric Light and Power Co., of Boston.

HUGH O'BRIEN,
Treasurer Brush Electric Lighting Co., of Boston.

ANDREW ROBESON,
Treasurer Weston Illuminating Co., of Boston.

FRANK RIDLON,
New England Agent Brush-Swan Electric Light Co.

J. ENGLISH,
Treasurer New Haven Electrci Co., Bridgeport Electirc Co., Newport Illuminating Co.

W. L. GARRISON,
Treasurer Edison Electric Illuminating Co., of Brockton.

[The blank contains a set of queries upon the property, requesting information upon the extent of the plant, description of station and surroundings, fire appliances, and value of property, and amount of insurance. —ED. ELECTRICAL REVIEW]

Notes from the "First Inventor" of the Morse Instrument.

Editors Electrical Review:

I notice in your edition of April 10th an article on my electric machine, constructed and used before Morse had made his system known, and before I had heard of the idea of transmitting news by electricity; and when the announcement was made that a telegram had been sent from Washington to Baltimore, I showed my instrument, and stated the alphabet must be made from these which I produced with the instrument, a photograph of which I send you, marked No. 2. No. 1 is taken from something, the likeness of which I constructed when a boy. Some folks call it a motor. No. 3 is an electric lamp, with ground glass stopper, and if the carbon fails it can be removed and another substituted. No. 4 (not shown) is a house on wheels I drove off a few miles a short time since, intending to get a photograph of the thing as it was originally, but learned that the wheels had become weak and the owner had substituted *terra firma*. That was constructed, and run by steam; it was built in 1848, and moved by horse-power or oxen, when I was fortunate enough to find any one willing to take the job. But as I had so much trouble in finding motive power when I wished to start, I conceived the idea of putting in steam, and consulted an engineer, who said he would do it. I employed him, and one day, after I had advanced $400, I asked him to explain his *modus operandi*. He did. I told him I could not furnish any more to work on that principle, and as he was a clever engineer he said: "Very well; you say how I shall proceed, and I will work accordingly." I thought of it one night, and then had him proceed under my dictation; and when it was completed, it would rise any hill or over sandy roads, only put on the steam. And that engineer was convinced that his theory would have been a failure, and that it would not work unless on a level, hard surface. But I also found trouble, and if water had been taken into account, it would not have been begun (and that engineer should have thought of that). I got tired of getting water, and went back to the natural motor. This house was constructed for the Daguerreotype business, to move from place to place, and I was one of the pioneers of that business.

A. G. NYE.

Weymouth, Mass., May 20.

Electrical Review.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Frank M. Gilley, 54 Equitable Building, Boston, Mass., is our New England representative.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill, will represent the REVIEW in the West.

Messrs. Wm. Dawson & Sons, 121 Cannon Street, London, England, are our representatives for Great Britain.

NEW YORK, JULY 24, 1886.

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An Exhibition of motors, tools, and machine tools for small industries, and for the production and application of electricity, will be held at Stockholm from July 12 to September 12.

According to Herr Japing, the hourly weight of water falling in the Niagara is one hundred million horse-power, and the total production of coal in the world would just about suffice to pump the water back again.

Near Bienne, in Switzerland, there is a water fall representing an energy of several thousand horse-power. A small portion of this power is utilized by a turbine, which works a generating dynamo (Thury system). The current is conveyed by an overhead line, consisting of a pair of copper wires (270 millimeters diameter) to Bienne, a distance of about a mile, where it works two electromotors. The installation has been at work with perfect success for over two years.

The wires of New York will now go underground.

All the electric wire companies report an excess of orders.

Anti-induction, non-combustible, double-back-action cables are now at a discount.

Those that gathered the Moss also took in the Flowers, and—we Hes-itate here!

The Mather Electric Company, of Hartford, are making rapid strides into the public favor.

One hundred and forty-nine plans for transmitting electric currents underground can now be bought cheap.

Now is an excellent time for you to make up your mind to go to the Detroit and St. Louis conventions, and plan accordingly.

The Bell Telephone Company have brought suit against the Wallace Telephone Company. The alleged infringement occurred in the Western district of Indiana.

The Julien storage battery, recently patented in Belgium, has the positive electrode made of a composition of lead, 95 per cent.; antimony, 3 per cent.; mercury, 2 per cent.

Mr. Leroy B. Firman, of Chicago, the inventor of numerous valuable electrical devices, and a widely known practical telephone and telegraph man, is spending a few days with New York friends.

We do not particularly object to contemporaries copying from our columns—it is an evidence of rare good judgment—but we think an occasional credit would be the proper thing. We draw the line at the filching of two columns, and this has been overstepped recently.

The digests of storage battery patents published from week to week in the REVIEW are attracting much favorable comment from our readers. They are carefully prepared, comprise a valuable history, and we are pleased to know that the REVIEW's enterprise in this direction is appreciated.

The Electrical Commission has awarded the contract of putting the electric wires of this city underground, as stated at length in our news columns. The contracting company, we are informed, is composed of responsible men who will faithfully carry out the provisions of this important work. The attorney of the company, Mr. Lauterbach, announces that his company has entered into an agreement with the Dorsett Company by which the latter will supply the requisite material and conduits as called for by the specifications. This is a wise move as this system has successfully stood the test of time in Chicago and Detroit, where it is in use by all the electric companies.

The Cincinnati Telephone Exchange is to be further improved by the addition of ten Western Electric multiple switchboards, which gives a total capacity of 5,000 lines. Capt. Stone, general manager of the Cincinnati Company, has built up one of the most popular telephone exchanges in the country. He has recently added the Oram telephone time repeater to the plant, and now, with the multiple system, will have a perfect exchange, as far as present improvements extend.

ANCIENT HISTORY.

The *Scientific American*, June 5th, 1847, contained the following note:

"A FEAT IN TELEGRAPHING.

"The Pittsburg *Gazette* gives a statement of an exceedingly delicate operation performed by M. Brooks, the telegraph operator in that city.

"This consisted in writing out a long message from the sound alone. The writing style being out of order, it was necessary to remove and repair it, but by the slight tick of the magnet every letter was distinguished and every word correctly reported during the whole day."

AN ELECTRIC LIGHTING MUTUAL INSURANCE COMPANY.

The circular letter, which was sent on the 15th instant to the central stations of electric illuminating companies in the Northeastern States, is signed by the financial representatives of the leading electric lighting interests at Boston, and we venture to state that, had there been any reason for so doing, scores of other names elsewhere could have been procured for the purpose; but any one of these names is a guarantee of strength and conservatism.

This subject of an electric mutual insurance company was first broached about six months ago by Mr. F. A. Gilbert, one of the signers of the present proposition, and considerable statistical information on the subject was collected by him.

After a careful examination of the facts, we indorsed the matter as presented by Mr. Gilbert at the Baltimore Convention of the National Electric Light Association.

But the formation of such a company on a successful basis is not a matter of corporate organization and the issuance of policies. The name of mutual insurance is not a phrase to conjure by and scare away fires with, but the success of the Factory Mutuals has been due to the fact that by reason of good buildings, good care and good protection the fires were few in number, and losses small in amount in the aggregate.

This circular plainly states that it will be useless to attempt to form the company unless there is a sufficient volume of business to reduce the ratio of expenses to a small proportion of the premiums. In the Factory Mutuals, we believe, about six per cent. of the premiums are required for expenses, and this is nearly paid by the interest on the premiums, but a new company could not hope for any such economy at first. Secondly, the insurance of such a company must be spread out over a great number of risks, and the policies written on property where there is not a great peril from other tenants or surrounding buildings of a hazardous nature.

Only a careful survey of the whole field will determine the circumstances and the exact conditions of supply of property suited to the conditions of good underwriting.

We do not wish to be understood as questioning the advisability of the proposed company; on the contrary, it is the best form of insurance. The replies to the circular, which we trust will be full, favorable and prompt, will fix upon the best course to be taken. We merely enforced the wise conservatism of the propositions contained in the circular, and commend them as a precursor of safe management.

The rubber manufacturers formed their Mutual Insurance Company about eighteen months ago, and have met with a phenomenal success, for since their organization the company has not lost a single dollar.

UTILIZATION OF WIND-POWER IN ELECTRIC LIGHTING.

Now that the storage battery bids fair to become commercially practicable, the present time presents a fitting opportunity for some of our readers to exercise their ingenuity, and devise means for utilizing the power of the winds to drive dynamos from which to charge storage batteries.

A fair-sized modern type of wind-mill, or engine, as they are now called, will, with the prevailing summer breezes, render available anywhere from 1½ to 3 horse-power. Now, given a dynamo, say, of 50 volts E.M.F., and capable of yielding a current of 20 amperes, with an armature speed of not over 240 revolutions a minute, we have all the requirements necessary to charge a plant of 20 storage batteries, (160 ampere hours, capacity .5 ohm internal resistance), in eight hours' time. That is to say, store sufficient current to operate ten 16 candle-power incandescent lamps (40 volts 1.5 amperes) for something over a ten hours' continuous run—all, and more than all, the amount of light required in any ordinary country dwelling.

We say a slow-speed dynamo, for the reason that mechanically they are preferable to high-speed machines, easier to keep in order, and better adapted for the varying power of wind-mills.

Modern wind-engines are regulated to very near a constant speed rotation; and, when there is any wind to actuate them, there is no fear of their "running away" and destroying the dynamo. Means, however, should be provided to break the circuit between dynamo and batteries, when the speed of the machine, and hence the E.M.F. generated drops below a predetermined amount, otherwise the current from the batteries would make a motor out of the dynamo. It is one great feature of the storage battery that its rate of delivery bears no relation to the rate of charge. Thus the wind-engine might vary the speed of the dynamo to such an extent that the charging current would range between wide limits (2 to 20 amperes), and yet the battery be capable (provided the required current had been charged into it) of delivering its usual working quantity. In short, a storage battery has its analogue in the gasometer, with the exception that in the case of the gasometer you can put the gas in as fast as you like, whereas in the storage battery you must not charge at a greater rate than that specified by the makers. Anything less than the maximum current can do no harm.

It would likewise be possible to so arrange the plant as to charge and discharge at the same time, as a charge of a given intensity can be continued long after the cells are full without injury. Various devices, however, have been suggested which act to break the circuit when the batteries are fully charged. On general principles, however, they should be avoided. Fancy devices, which require at least two copper-fastened, four-diploma, electrical engineers to be sent with each instrument to keep them in order, will hardly commend themselves to the prospective users of such a plant. A simple cut-out between battery and dynamo is all that is actually required. We have no doubt that some one will devise a good and cheap plant, such as we have indicated, and which will be largely introduced.

We commend the subject to our electrical friends.

CHICAGO ELECTRICAL NEWS.

The Cyclone, with his sisters and his cousins and his aunts, is on his summer vacation, and having lots of fun with the boys just now. In fact electrical storms of several varieties seem to be posted for July quite generally. From Kankakee, Ill., comes an account of a severe storm in which hail stones cut down corn that was standing six feet high, and mowed clean swaths through timothy and oats. The glass was broken out of all the north exposures of buildings, while houses and barns were unroofed, and some stock killed. One residence in Pilot township was three times struck by lightning within an hour, the last stroke setting fire to and destroying the structure.

Dixon, Ill., reports a severe storm of a similar nature on the 11th. Various buildings were prostrated, fruit was stripped from the trees, while telegraph and telephone lines were extensive sufferers. Plenty of lightning illuminated the show, and several houses were struck by it, in one or two instances resulting in conflagrations.

At Bridgeport, Ill., on the 10th, lightning struck in several places. The O. & M. depot was fired at the switchboard and burned to the ground. The town was saved by a deluge of rain. Lightning ran both east and west on the wires, firing and partially destroying the depot at Sumner, and doing considerable damage to the depot at Lawrenceville. The Presbyterian church at Sumner was struck and badly damaged. The B. & O. and the W. U. Telegraph Co.'s are heavy losers. The former lost five wires including two quadruplex lines.

Champaign, Ill., reports heavy losses in grain, and considerable damage by fire and wind burning and overturning buildings.

Bloomington says the cyclone devastated the cornfields of Woodford, Southern, Livingston, McLean, and parts of Dewitt, Ford, Macon and Champaigne Counties. Trees and growing corn were pulled up by the roots and blown away. Fowls were killed, and exposed windows were broken. No lives were lost.

At Atlanta, Ill., one farmer lost seventy acres of corn and fifty-two acres of oats.

At Clinton, Ill., trees, telegraph and telephone lines, and standing grain suffered severely, and cattle were killed by lightning near Kankakee. Two persons were killed near Olney in a residence which was struck, while four others who were in the building were unharmed.

On the 13th we had an electrical exhibit here, the like of which the city has not known in a long series of years. The day had been oppressively warm, when, to the great relief of all, a rain storm became imminent, about the middle of the afternoon great quantities of water fell, and mingled with this was a considerable quantity of hail. The stones which fell were quite heavy, specimens as large as black walnuts being no rarity. The peculiar formation of these is worthy of notice. The center or nucleus in all cases was made up of white, opaque ice, while the outer layers were of transparent ice. When one of these was cut in halves it had much the appearance of a milk white pearl set in crystal.

The wind had increased during the progress of the storm, and the air partook of the sickly hue which betokens the advent of a cyclone or a tornado.

Immediately succeeding the hail storm a tornado came inland from the lake, making the shore between Thirty-fifth and Twenty-second streets, but extending inland but little west of Cottage Grove avenue—less than half a mile at the widest point.

At the foot of Twenty-fifth street was located the Lakeside Sanitarium. Here during the severe days of summer were congregated conventions of babies in charge of trained nurses, while the mothers were playing the role of breadwinners elsewhere.

The Sanitarium was a simple, unpretentious affair, consisting of a platform 150 feet in length, over which was a roof supported by posts fixed in the ground. Awnings protected the inmates from the fierce rays of the sun, and within were hammocks, and swings and rocking chairs. At either end of the shed were rooms for cooking and for stowing the furniture at night, and when necessary sheltering the nurses and little people in case of sudden storms.

One and one-third dozens of these little humanities were on the premises when the hail storm came up. With a scamper all hands hurried into the frame building at the north end of the sanitarium, when almost immediately a terrible wind from the northeast seemed to meet an equally strong one from the opposite direction, resulting in a strong rotary motion; the building was twisted, caught up; the posts were pulled out of the earth, the frame carried three or four feet west and set down, the roof meantime blowing to pieces, and scattering in every direction.

Part of the falling roof blocked the door of the building, making prisoners of the nurses and their charges. Fortunately the building, while considerably racked and twisted, was neither blown over nor unroofed, so that no one was injured.

Of course, there was considerable of the Little Buttercup style of mixing up, when the little people were distributed around the neighborhood, to be dried and coddled and bottled, awaiting the return of their maternal ancestors, which was not long, for rumor carried the news of the disaster, with all sorts of rheumatic distortions, far and wide. The orderly's report, "All present or accounted for," brought peace and thankfulness to all before sunset.

All along Cottage Grove avenue, for a mile and a half south of Twenty-second street, the storm left the impress of its trade mark. Trees, twenty-five years old, were pulled up by the roots or broken off.

A green-house and flower garden at 2910 Cottage Grove avenue, was damaged about $1,000. The proprietor says he picked up hail-stones one and three-quarters of an inch in diameter.

Windows without number were either blown in or the glass pelted to pieces by the hail, all along the route of the storm, and many a chimney or loose board structure was felled to the ground. It was not a cyclone, however, but a tornado.

A final decree was entered on the 10th, by Judge Tuly, in the case of Jeremiah Terwilliger against the Great Western Telegraph Company and its stockholders, finding that its outstanding indebtedness is $375,000, and its assets have all been exhausted, except the liability of its stockholders. That there are about 2,000 stockholders, residing in twelve States, some of whom have paid but 40 per cent. of the par value of shares, and that an assessment of 35 per cent. is necessary to meet the indebtedness. The receiver, E. R. Bowen, is authorized to collect this amount—peaceably if possible, forcibly if necessary.

Prof. H. S. Carhart, of the Northwestern University at Evanston, Ill., whose experimental investigations in the physics are world-renowned, has accepted a call to the chair of physics in the Michigan State University at Ann Arbor, a position to which he was elected by an unanimous vote.

The institution is to be congratulated on the selection; for however well-known the Professor may be to them through his reputation, the faculty and the students will soon learn by social contact with the gentleman that in calling Prof. Carhart they have builded wiser than they knew.

Under date of July 12, an Omaha dispatch stated that Superintendent Dickey, of the Western Union, had been presented by a committee of four with the following:

"We, the undersigned, representing the operators employed by the W. U. Telegraph Co. in Omaha, respectfully inform you that said operators hereby demand that they be paid full extra wages for all overtime, and that unless said demand is complied with at or before noon, July 13, said operators will refuse longer to continue in the employ of said company."

This action is taken with the sanction of and in concert with the operators employed by the W. U. T. Co., at Ogden and San Francisco. At half-past five the chief operator discharged one of the committeemen, whereupon six other operators walked out; later others quit, making a total of fifteen out of the night force. About twenty of the day force will quit at noon to-morrow, if their extra time is not restored. The entire force is about fifty. Telegrams have been received from Ogden saying, "We are with you, and will strike to-morrow." Telegrams of sympathy and support have been received from San Francisco, Kansas City, and points in Texas. The men are determined, and say they will stand together. They feel sure of winning by the aid of Ogden.

Col. Clowrey, the next day, in an interview, is reported as saying that there is no truth in the dispatch above about an intended strike by the employes of the W. U. Co That only about five per cent. of their operators are dissatisfied, and those would be always, under any circumstances.

As nothing more was heard of the proposed quitting after the dispatch referred to, why, it is fair to presume that something has been done which rendered the strike unnecessary.

Col. S. G. Lynch, broker, at No. 146 La Salle street, gives the following as telephone stock values:

Chicago	$365 @	$375
Central Union	45 @	47
Michigan	63 @	65
Iowa Union	15 @	18
Great Southern	30 @	32
Great Southern, Script, 90 cents on the dollar.		
Colorado	$18 @	20
Rocky Mountain Bell	40 @	45
Missouri and Kansas	55 @	57
Missouri and Kansas, Script, 55 cents on the dollar.		
United	15 @	17
Cumberland	65 @	70
Wisconsin	103 @	105
Bell of Missouri	147 @	150
East Tennessee	175 @	180

CHICAGO, July 19, 1886.

Lancelot Hope Everett's Invention.

Editors Electrical Review:

In your issue of June 26th I find the following:

Some one writes the REVIEW over the signature of "Station F," New York, to the effect that he had "received money, letters, drawings, etc., from L. H. Everett, the 'latest inventor' of the telephone, long after his attorneys claim that he disappeared." If "Station F" knows where Lancelot Hope Everett is at the present time, now is an excellent time to let his information be known.

Does L. H. Everett stand any place in the Patent Office with reference to the telephone? I met him in 1874 in Jacksonville, Fla He then talked telephone, and claimed to have patents and apparatus, but being looked upon as a crank little attention was paid to him. I afterwards met him in New Orleans in 1878, after Bell had brought his telephone out, and Everett still claimed to be the original. From the fact that I was with him a great deal in 1874, living in the same house with him, I have a little curiosity to know what significance there is to the notice enclosed.

P. W. B.

Lawrence, Kansas, July 15.

[Mr. Everett's so-called telephonic invention was described in the ELECTRICAL REVIEW June 5, 1886.—ED.]

The Deaf Telephone Ear.

Editors Electrical Review:

I notice the Troy papers are claiming as a fact that the use of the telephone has caused deafness in the left ear of a number of their citizens. I am unaware how much the Troy subscriber is accustomed to use the phone for dunning customers, but my five years' experience at the business goes to show that that manner of use is the only one in which deafness is caused. In placing instruments for new subscribers I have, in several instances, found them afflicted with impaired hearing in one ear, and unaware of such fact until so discovered. My own hearing in the left ear has become more acute since using the telephone, and several of my operators, whom I have consulted, have had the same experience. I advise new hands, when off duty, to protect their phone ear, as I think the constant use makes it more sensitive.

GEO. B. SHEPARD,
Manager for St. Lawrence Telephone Co.
Ogdensburg, N. Y., July 20.

Copper may be slightly hardened by closing the grain. This can be done by lightly hammering its surface with a round penehammer.

An insured message once reached a New York firm containing the single word "Yes." Notwithstanding the extra precaution of insuring the telegram, it should have read "No," and to this day the error has never been satisfactorily explained.

Sugar can be made from any description of vegetable fiber, such as sawdust, rags or tow. The process is to digest for several hours in sulphuric acid; then to dilute the mixture with water and to boil for some time, when the rags or what not will be found to have undergone a magical change, and to have been converted into sugar. A curious fact is that 100 parts of rags will yield 115 parts of sugar, the increase in weight being due to the elements of water absorbed during the change

Wrinkles — Electrical and Otherwise — Practical and Otherwise.

To soften bright work without damaging the finish, place the pieces in an iron box and fill in the interstices with iron turnings; close the box, lute the cracks with fire-clay, and heat to a red, allowing the box to cool as slowly as possible. It is a good plan to let the furnace fires go out, and leave the box in the furnace to cool.

Ordinary solder, 2 parts tin and 1 part lead, will flow smoothly on tin when dipped by previously putting salammoniac on the surface to be tinned.

To demagnetize steel: 1. Heat it to a red heat, and allow it to cool slowly. 2. Place the steel on a magnet, with the same poles touching the same poles of the magnet, and repeat the operation till total demagnetization has taken place.

To remove blue color from steel: 1. Use 1 part oil of vitriol to 10 parts water. 2. Dip the articles in a strong solution of cyanide of potassium nearly boiling. 3. Dip the article in hydrochloric acid, and quickly rinse in clean water.

To clean greasy cotton waste boil it in a strong solution of common soda in water, and save the resultant soapy liquid to keep your drills and reamers wet when boring iron.

To harden cast iron mix ½ pint oil of vitriol and 2 oz. saltpeter in 3 gallons of clean water. Heat the iron to a cherry red, and dip as usual.

To ease a nut, that is a little too tight upon a bolt, place it upon the bolt, and, resting it upon an iron anvil or block, strike the upper side with a hammer, turning the nut so that not more than two blows will fall upon the same face. The smaller the nut the lighter the blows should be, and *vice versa*.

The reason that a screw is driven more easily into wood by a long than by a short screwdriver, is that the tool is held at an angle, and consequently the long screwdriver affords a greater leverage than a short one. If both were secured so as to be at right angles to the face of the screw, there would be no difference in their action.

The best material to grind plugs in cocks is the red, well-burnt sand from from the core of a brass casting, the sand being sifted, before using, through fine wire gauze. It will cut more truly and smoothly than any other material, and should be used with water, and not oil. After the cock is sufficiently ground wash it and the barrel with clean water; and after wiping them comparatively, but not quite dry, revolve the plug backward and forward in its place under a slight pressure, and the surface will assume a rich brown color, showing very distinctly the precise nature of the fit, and leaving a smooth surface free from grit and not liable to either jam or abrade. Valves may be ground to their seats in a similar manner.

To soften copper or brass heat to a low red heat and plunge in salt water.

The American Bell Telephone Company obtained an injunction on Monday of this week, against the Washington Telephone Company, and the Washington Telephone Co. of Baltimore, both licensees of the Pan-Electric Telephone Company. The hearing was before Judges Bond and Morris. The chief point relied upon by the defendants was the Government suit, and the court said with reference to that point, that the near pendency of that suit would have no bearing upon the suit before it—that it would be time enough to give weight to the Government suit when a decision had been reached by the court having jurisdiction over it. This decision adds materially to the dejection of the Pan-Electric people.

Telephonic News

*** Bell telephone has gone to 205. An extra "of 4 per cent. is talked of, and the street" has it that it will be declared about Aug. 1.

*** The Elmira, N. Y., press is calling on the council to revenge the fact that the telephone company refuses to permit the city free telephones.

*** A telephone company has been organized in Greensburg, Penn., with a capital stock of $10,000. The name of the company is the Westmoreland.

*** Experiments were made recently with a telephone between Vienna and Brunn—a distance of 150 kilometers. Although the weather was very bad, the results were successful.

*** Articles of incorporation of the North American Underground and Electric Company have been filed in the Secretary of State's office, Albany. The purpose is to construct electric conductors (underground) in New York. The capital is $2,500,000.

*** The Brown Telephone Company has petioned Evansville for the right of way in that city, to take place of the "cut down" Cumberland Company. The District Telegraph Company has been granted the privilege of putting telephones in the city departments for experimental purposes.

*** Captain Gifford, of the Ohio Valley Telephone Company, states that the recent severe storm had done his wires but little damage. Said he: "Whenever a lightning storm comes up it does us more or less damage, but we expect that, and have prepared for it. The storm of last night cut the wires between here and Bardstown, Brandenburg, West Point, Elizabethtown, Corydon, Ind., and Madison, Ind. The lines between Pewee Valley and Eminence are somewhat injured. We will have everything in shape by sundown."

*** This has been a "telephone day" par excellence. American Bell led the procession, selling to the amount of 1528, while the price moved up ten points from 206 to 216, with the last sale at 215½ The directors meet to-morrow, and rumors of a large extra dividend, and possibly valuable rights in connection with the Long Distance Telephone Company, helped inspire the bulls, some of whom modestly claim that the stock is booked for 300. Three per cent. was paid to-day for the right to call 100 shares at 230 within sixty days. The "extra" dividend is set at $4, and the "rights" at $20 to $25. —*Boston Post.*

*** Frank L Freeman, of Washington, D. C., who is a member of the company which has secured the contract for building the electric subway in New York, is a member of the firm of Foster & Freeman, patent attorneys, and makes a specialty of the electric branch of the firm's business. He was appointed as an examiner in the Patent Office in 1875, and placed in charge of the division of printing. In 1880 he was made chief examiner of the division of electricity. He served as such for three years, and then became a member of the firm with which he is now connected. Mr. Freeman returned July 16 from an extended visit to the North. He declined to answer any questions regarding his connection with the company which is to build the New York subways, or to talk about the subject at all, on the ground that the newspapers would have a good deal to say about the work in New York, and much of it would be in the nature of criticism. Mr. Freeman's firm has business relations with the Bell Telephone Company, the United States Electric Lighting Company, the Baltimore and Ohio Telegraph Company, and some other corporations and persons interested in electrical matters.

*** The Kansas City Telephone Exchange is now on the home stretch for 1,600 subscribers. Three years ago there were but 276 subscribers at this point, but the excellent work of the Missouri and Kansas Telephone Company, when it came into possession, soon changed all this. The ninth multiple switchboard has been ordered, and it has been found necessary to tear down an adjoining partition so as to extend the operating room.

*** It has been suggested that the system of telephone fire alarms be introduced in Quincy, Ill. This system has been used for some time in Kansas City, Indianapolis, Springfield, and in many other cities having a complete and efficient telephone service. By this system the telephone office is connected directly with all the engine houses and with the residences of the chief engineer and his assistants, on a single metallic circuit. When an alarm is sent to the telephone office, it is at once sent to all the engine houses and to the chief engineer at the same instant. This alarm is given over the telephone, and the exact location of the fire is distinctly stated. By this means the alarm is given very promptly, and it has given universal satisfaction wherever it has been used.

*** Secretary Barney, of the National Telephone Exchange Association, announces that the next annual meeting of the association will be held at the Southern Hotel, St. Louis, Mo., commencing on Tuesday, September 7, 1886, at 11 A. M. Arrangements have been perfected by the secretary whereby delegates from New York and those passing through, will be transported to and from St. Louis at a greatly reduced rate. Full details concerning the trip may be obtained by applying to him, either in person or by letter. The following reduced rates have been obtained for members of the Convention, from the Southern Hotel: per day, on the American plan, for inside rooms, $3.00; for outside rooms, $3.50; for rooms with bath, $4.00; for rooms on parlor floor, $5.00. Vice-President Geo. F. Durant, general manager of the Bell Telephone Company, at St. Louis, writes that he will be glad to secure rooms for delegates and exhibitors, upon request being made to him. The blanks for the usual statistical report have been mailed to all members of the association. It is hoped that they may be promptly filled up and returned, to give time for examination and consolidation into the secretary's general report.

*** The Board of Directors of the Wallace Co-operative Telephone Company has reorganized, J. M. Ridenour, William Bosson, William Wallace, J. H. Stewart and Mr. Vance, the latter of Louisville, Ky., retiring, and Louis Hollweg, Henry Schnull, J. W. Schmidt, H. C. G. Bals, W. H. Wiles and J. R. Ross succeeding. The reorganization is understood to be the result of disgust over the ordinance under which the company will be compelled to operate, if it operates at all, in the city of Indianapolis, the retiring members regarding the feasibility of the work as doubtful. Mr. Wallace, the patentee, was asked regarding the reorganization, but declined to say anything further than that the foregoing parties retired and others were substituted in their stead. "I won't state the reason for their retirement," said he, "for I am misrepresented every time I open my mouth to a newspaper man. I won't say a word about it." By changing the force of the question somewhat, the reporter learned from Mr. Wallace that the retiring members of the directory did not like the ordinance, and for that reason they withdrew. "I was told two months ago that they did not propose to do anything," said he, "and I became convinced that it was so. We now have a better company, and propose to go to work" Mr. Wallace is reported to have said that he intended to prosecute any one who by threats or intimidation of any kind attempted to prevent any one from taking stock in the company. He says that he will proceed in much the same manner as has been the case in the East, where boycotters have recently been successfully prosecuted.

Telephomania in Indiana.

A BOOMERANG IN EVANSVILLE—THE TOLL SYSTEM IN OPERATION IN INDIANAPOLIS, TERRE HAUTE, RICHMOND AND FORT WAYNE—NO MATERIALIZED OPPOSITION COMPANIES.

At certain seasons of the moon the city councils at some places in Indiana appear to be affected with telephomania, the symptoms of which are violent anger at the mention of the Bell telephone, and a seeming irresistible desire to destroy telephone property of every description, that is in any way connected with the Bell telephone.

The latest outbreak of this malady was at Evansville, where the Cumberland Telephone Company finding itself unable to operate its exchange under the three dollar rental law as interpreted by the State Supreme Court, and give day and night service, had, in order to reduce its loss, closed the exchange at night.

The moon was in the right quarter about this time, and the city council had an attack of telephomania, and while under its influence passed a resolution that unless night service was restored, all lines raised to a specified height above the street, and the city given three per cent of the gross receipts of the Evansville exchange, and a formal acceptance of these conditions by the Cumberland Company filed with the city clerk by noon of July 8th, the poles and wires would be cut down by the city officials at that time.

No acceptance was filed, and at the appointed time the police and fire department began the work of destruction, and continued it until all the poles and wires were prostrated, and the streets filled with debris.

The telephone company has removed all telephones and shipped them to Boston, and the peaceful graveyard quiet of Evansville in its progress backward to a primitive wilderness will not now, for some time at least, be disturbed by the jingle of a telephone bell, or the mellifluent "hello," or "they are talking now" of the telephone girl.

This official riot and vandalism does not meet with unanimous approval of the people of Evansville, who realize, too late, the damage to the business and reputation of the city the wanton destruction of telephone property and the absence of telephone facilities will be, and a meeting to give expression to their views was held, at which, after several warm speeches by leading business men, denouncing the council and city officials, the following resolutions were unanimously adopted:

Resolved, That we, as citizens, in mass-meeting assembled, do hereby denounce the action of the City Council, whereby the property of the Cumberland Telephone Company was wantonly vandalized and destroyed, without authority of any court of law of this land.

Resolved, further, That the telephone subscribers' business interests have been outraged and damaged, and steps should be taken at once to recover damages for the vandalism committed July 8, 1886.

Resolved, further, That in view of repeated usurpations of power by the Common Council and their disregard of the rights and privileges of citizens, that a necessity has arisen for the employment of a committee of safety, whose duties shall embrace not only a surveillance of our public servants, but to closely watch all necessary local legislation.

It is said that the Cumberland Company will bring suit in the United States Court against the city for damages, and will criminally prosecute the city officials who were active in the destruction of property.

The city Councils at LaFayette and Indianapolis had similar attacks of the mania, but as yet have not reached the destructive stage. At the former place the poles and wires of the Central Union were ordered removed from the streets by July 15, but, apparently, no steps looking to a compliance with the order have been taken, and a petition for a reconsideration of this action, signed by a large number of citizens, is before the council, and the toll system, with over 200 stations, is in successful operation.

At Indianapolis, the council ordered the removal of poles and wires within fourteen days, but upon the request of numerous citizens and telephone patrons revoked the order, and authorized the company to use its present plant until a new company should be ready to occupy the field on a $3 rental basis, and some 700 toll stations are now in successful operation. Meanwhile, the "Wallace Telephone Company," in whose favor a non-transferable ordinance was passed, is endeavoring to induce the council to make modifications that will render the franchise more valuable as an article of merchandise, and says: "If this is done, work will be commenced at once;" but as the poles of the Central Union are on the streets where the Wallace Company says it wishes to erect its lines, it is believed that another attack of telephomania is hoped for to help the Wallace out; though a representative of that company has said that the Wallace instruments infringe upon the Bell patents, and a suit for infringement is now pending against them in New York.

The toll system of the Central Union is in successful operation at Indianapolis with some 700 stations, and at Terre Haute, Richmond and Fort Wayne, with over 200 stations at each place, and while the telephone service and accommodations are not as satisfactory to patrons as under the old plan, it is thought to be much better than none, and a great deal better than walking in "dog-days."

The decision of the court at New Orleans in the telephone case was extensively published in Indiana, and the people are beginning to recognize the fact that any telephone service they receive will have to be furnished by the Bell Company or its authorized agents, and that nothing may be expected from the various "fly-by-night" schemes that are forced upon their attention, and that a fair compensation must be made for services rendered, but it is believed that when these facts are fully accepted the trifling with bogus telephones will cease, and service under the toll plan be accepted as the best possible under the circumstances, until the sentiment of the people can find expression in the repeal of the law.

One Man Nervous Already.

Edison is working on a plan for sending odors by electricity. If he succeeds he had better leave the country, for then the utility of the telephone will be gone forever, and the man with the cloven breath can no longer conceal the fact from the wife at the other end of the line.—*Lowell Citizen.*

The Plan of the Conduit for New York Wires.

In obedience to a resolution passed by the Electrical Subway Commission, on June 30 the engineer of the board, John Thompson, has prepared in detail a system of electric subways, to be constructed of concrete. The plan contemplates a main trunk system of conduits connected at intervals with inclusive junction. The main sections are to be rectangular in cross-section, and perforated longitudinally by a series of ducts for the reception of wires and cables. The junction boxes will be shallow cases, formed by a single casting of iron, sunk into the street surface until the edge of the open portion of the box is flush with the paving. They will be provided with heavy outside covers to take the strain of the street traffic, and inside covers screwed down on gaskets to secure water-tight joints. The cables and wires will be spliced, tapped, and handled generally at the junction boxes, the operators being practically at the surface of the street.

To make a continuous subway the conduit sections, after being laid, are to be first brought into alignment by inserting mandrels in the ducts, a cast-iron sleeve being then slid over the contiguous ends of the section. To the opening on the upper side of the sleeve a steam hose will be secured and steam turned on. Under the influence of this the ends and sides of the sections will become plastic, the hose will then be removed and melted asphaltum run into the opening, completely filling the space within

the sleeve and around the mandrels between the faces of the sections. The joint will thus be welded and form a homogeneous mass throughout, thus, with the added strength of the sleeve, insuring as great strength at the joints as in any other portion of the sections The advantage claimed for this process is that the conduit will be made water and gas tight throughout, and that the several ducts will be maintained in perfect continuity from junction box to junction box. The bottom of the trench in which the sections are to be placed will be filled with beton, or asphaltum concrete, to a depth of from four to six inches, thus forming a level and solid bed, and above the conduit a layer about an inch deep of nearly pure asphaltum will be run. Over this will be three or four inches of sand, or just enough to properly bed the paving stones and insure a uniform area of bearing surface. All wires and cables will be easily accessible from the junction boxes, and in consequence of their proximity to the surface, they can be readily inspected, inserted, or withdrawn.

It has been deemed prudent to provide a distinct separation of the systems to accommodate distinct classes of conductors, and the main or trunk conduit will be used for telegraph and telephone wires only. For the arc circuits concrete sections similar to the main conduit will be laid, but with ducts about three-quarters of an inch in diameter This conduit will also be provided with junction boxes for handling the conductors, and when feasible it will be laid on a lower plane than that of the main subway. The incandescent conductors will also be separately incased.

In extending the main conduit systems by cross-connections and branches, and to tracts of the city notthickly wired, it is proposed to simply lay heavy iron pipes of sufficient capacity to meet the requirements of the service. These will radiate from the junction boxes at street intersections in the same manner as the main conduits. The limit to the use of iron pipes in the cross-streets, however, will probably be that in which a single cable will afford a sufficient number of conductors for the required service.

Connections with houses, and local or unitary distribution of wires, will be made from the center of blocks, the wires being brought there from the nearest junction box, through a special pipe. In special cases, however, other provision will have to be made, and the plan proposed is as follows: A small iron pipe will be laid on top of the main conduit, thus bringing it in close proximity to the street surface. This pipe will be connected at the junction box in the same manner as the main conduit. At suitable intervals, about one for every two buildings, a small service box is to be provided, having a sealed cap. The cap will come close to the paving stones, and be reached by removing the stones above it. From the boxes will radiate to the right and left smaller service pipes, through which any wire, having been tapped at the junction box, can be led into any house desired and connected with instruments. The pipes used in distributing may be filled with non-conducting mastic, or separate ducts may be formed in them, as circumstances may require.

The junction box system, it is claimed, offers special controlling advantages, among which are these: The cables may be completely incased through the junction boxes; partitions may be formed in the boxes providing separate compartments for different systems or companies, thereby effecting a complete separation in any inclusive box, and when the service may require it junction boxes may be provided with separate covers, or distinct and separate boxes may be furnished. The iron pipes in the branches and connecting service will be heavily plated with coal-tar pitch to prevent rusting, and this treatment will also effect a degree of insulation in the pipes. In special cases of proximity to steam pipes, the conduits will be protected by a sheathing of mineral wool in the case of the concrete to protect the section itself, and in the case of the iron branches to protect the wires and cables.

Assistant Engineer Kearney, to whom the board referred for report the question of the capacity of the conduit required for different classes of wires in the city, and the order in which different sections of the city can be most conveniently supplied with subways, has made a preliminary report, in which he says that the telephone companies are desirous of having space in the main conduits. Above Canal street they require twenty-four ducts of 2½-inch diameter each, and below Canal street from thirty-six to fifty ducts, according to locality, of the same diameter.

How the Unsuccessful Companies Feel About the Awards.

[From the New York *Tribune*.]

The Consolidated Telegraph and Electric Subway Company, of this city, whose proposal to place the electric conductors underground was approved by the Subway Commission on Friday, filed yesterday a copy of the articles of incorporation with Mr. Sefton, the commissioners' secretary. The company, through its officers, also expressed its intention to comply with the provisions of the commission's agreement with it, and to be ready soon to furnish the bond for $500,000 as a pledge of its proper performance of the work. If D. H. Dorsett, whose proposition was not accepted on Friday, is invited to have a share in the Consolidated Subway Company's works, it was stated in various quarters yesterday that the construction work would probably be begun at once, as Mr. Dorsett is already in possession of the plant and machinery necessary to laying the conduits. Besides this, the material to be employed in the constructive work is more nearly like that furnished by Mr. Dorsett than any of the other companies, and for that reason it would take new companies some time to get ready the requisite machinery.

The work of removing the telegraph poles and standards, wherever they now are, is to be done at the expense of the companies operating the wires thereon. As to the construction work, if the most is made of the available plant, it is predicted that as much as a quarter to half a mile a day of conduit can be laid, depending on the number of gangs of men put to work. The Subway Commission reserves the right to modify the plans or construction of the system, and the material used, at any time that it deems proper. Spaces shall be rented to any authorized company operating in any street or high way in the city that may apply for them. No company can lease spaces that they do not actually need to the detriment of others who may desire to use them. No charge is to be made to the fire, police or other city departments for their electrical conductors. The rent to be collected from all others using spaces shall not exceed the present cost of maintaining conductors to the companies occupying them.

It was stated yesterday that in all probability the Consolidated Subway Company would be served with an injunction in a day or two, or as soon as the contract between it and the commission was signed, restraining it from beginning work. The injunction will be procured by some one of the disappointed companies that presented proposals to the commission on Friday and failed of acceptance. They claim that certain of their patented rights will suffer. The Consolidated Subway Company says that it is expecting such a step against it, and will be prepared to offer a bond, pending the issue of the decision on the argument. The company is confident that no delay will result to the beginning of the work by such proceedings.

Successful Substitute for the Bell Cord on Railway Trains.

Until within a few years, the only method of signaling between the various portions of a passenger train and the engine has been by means of a bell cord running through the cars and across the tender to a belt in the cab of the engine, though in starting the train from stations the conductor has motioned with his hand in the daytime or swung a lantern at night. These methods have many imperfections, and have been attended with many difficulties, and various attempts have been made to supply a substitute for the bell cord, which should be more reliable and more quickly operated. Naturally, in these days of electricity, inventors have sought to employ that force in accomplishing the desired object. While the use of electric bells in dwellings, stores, offices, etc., is common and easily accomplished, the same appliances cannot be used on a railroad train on account of the difficulties of securing perfect and reliable connections between the several parts of the train. Many patents have been secured on different styles of couplers for such connections, and some few of them have worked very satisfactorily, though the great majority have proved failures when subjected to practical tests in all kinds of weather. Friday afternoon the writer, in common with other newspaper representatives and a number of railroad men, witnessed an exhibition of a device that is perfectly automatic in operation. The test was made on the Fitchburg Railroad, where a locomotive and two passenger cars equipped with the device have been running for a number of weeks. The common bell cord is retained in the cars, but instead of passing from one car to another it is connected at each end with a wire which runs down through the floor and by a tight-fitting cap into the interior of the rubber hose of the automatic air brake. By an ingenious arrangement of buttons, the act of uniting the coupling of the air brake establishes the electric connection. The electric current is produced by six Le Chance batteries, which are hermetically sealed and placed in a suitable box in the cab of the engine Of course, an open circuit is used, and by pulling the bell rope in any part of the car the circuit is closed and a gong in the engine cab is rung, and the same effect is produced by the breaking apart of the train. The device is the joint invention of Messrs. George D. Burton, of New Ipswich, N. H., and Charles H. Magoon, of St. Johnsbury, Vt. For the purpose of equipping railroad trains with the device, a corporation called the Automatic Electric Signal Company has been organized under the laws of the State of Maine, with a capital stock of $10),000. Mr Magoon is president, and Mr. Burton secretary and treasurer, and the directors consist of Messrs. John H. Fox, of East Jaffrey, N. H., and Luther F. Lewis, Murray V. Livingstone and J. T. Wilson, of Boston. A. C. B.

Boston, July 16.

The Influence of Storms on Subterranean Telegraph Lines.

Electric discharges have been frequently observed at telegraph offices where the stations are connected by means of subterranean wires, and a storm has taken place somewhere between them. For example, during a violent storm which occurred on the 9th of March, 1885, midway between the towns of Belfort and Besancon, France, sparks were observed at the telegraph instruments in these two stations, although in the towns themselves there was not the slightest indication of atmospheric disturbance. The phenomenon, it is thought, may be explained either as an effect of electro-dynamic or electrostatic induction. If the cable is buried at only a small depth in soil of low conducting power, the metallic guard is more or less charged under the influence of magnetic storms, although the conducting wire is quite free from charge. At the moment of a flash occurring, the metallic guard is suddenly discharged, either partially or altogether, and passes to earth in the two opposite directions. There are thus developed in the conducting wire two induced currents in opposite directions, whose difference alone influences the instruments at the extreme stations. This effect must be very small, as, the electricity passing rapidly into the soil, the induction can only be very limited. A second effect results from the circumstance that, the discharge of the metallic guard not being instantaneous, its electric potential diminishes suddenly. The free electricity reacts on the conducting wire, which is suddenly charged with electricity of an opposite sign through the points in communication with the earth —that is to say, through the telegraphic apparatus. The exterior charge in passing away produces in the conductor an electric movement opposed to the former, which it follows so rapidly that it generally counteracts it, and thus it happens that it is only very seldom that the phenomena referred to are observed.

TELEGRAPHIC

.... The Western Telegraph Company, Oberlin, O., has been organized. Capital stock, $15,000. James A. Sheridan and others, incorporators.

.... Dr. Norvin Green, president of the Western Union Telegraph Company, is reported to have joined the Board of Directors of the forthcoming American Exhibition in London as a vice-president of the General Council.

.... The Railway Telegraph Supply Company, of Chicago, has opened a branch house in St. Louis. General Manager Knapp, of this company, has secured quite a large business through his aggressive efforts, and the opening of this branch house became necessary in view of this fact.

.... The city fathers of Long Island City have adopted, after endorsement by the Police Commissioners, the Gamewell system of police telegraph, with telephone attachments. The contract was made by Mr. Rolfe, of the Gamewell staff, who is securing considerable business for this reliable company.

.... The B. & O. Telegraph Company is arranging to put the district messenger system in Trenton, N. J., in connection with its telegraph system. Arrangements have been made to put in 150 boxes, and more will be added if there is a demand. Manager Hall is confident that this will be a success, and is pushing the work vigorously.

.... At the meeting of the Franklin Institute, the report of the Committee on Reorganization was received and portions of it adopted, regulating the construction of a new building; the establishment of a "School of Handicraft to teach the underlying principles of the several trades, and the handling, use and care of the tools employed therein;" vesting property of the institute in a board of seven trustees, etc. The amendments to the by-laws which will be necessary to put these recommendations in force were read by their title, and will come up at the next regular meeting.

.... The superior quality of insulator pins manufactured by Messrs. Brownlee & Co., of Detroit, seems to be duly appreciated by the trade. The demand for their pins has grown so rapidly that they have been compelled to put in new machinery, which will double their capacity. The machines used by Brownlee & Co. are the most rapid and accurate in use. The firm are making a specialty of 1¼-inch pins 8 inches long—1 inch shorter than the ordinary pins. These pins are stronger and better in every way than 9-inch pins, and cost considerably less.

.... Dr. Andries having calculated that accidents from lightning have increased by from three to fivefold during the last fifty years, finds that the causes which have been assigned for the phenomena do not account for all. He regards the main cause as lying in the enormous increase in manufactories, locomotives, etc., which fill the air with smoke, steam and particles of dust of all kinds, while the increased populations contribute their share to the impurity of the atmosphere. His own experiments and those of others have shown that all the electrical phenomena of the air increase in intensity with the increase of dust in it.

.... A mortgage was given by the Bankers and Merchants' Telegraph Company in July, 1883, on its property in New York, New Jersey, Pennsylvania and Delaware for $300,000. The Farmers' Loan and Trust Company, trustee of the mortgage, brought a suit a year ago for foreclosure. While this action was pending, the United Lines Company, which purchased the Bankers and Merchants' property under foreclosure of the second mortgage, and Gen. Farnsworth, the receiver under the foreclosure proceedings, put in various technical defences. Judge Lawrence has ordered judgment for the plaintiff on the ground that the defences were not valid.

ELECTRICAL AND SCIENTIFIC

* * The fire whistle on the Pemberton Mill, Lawrence, worked by electricity, was sounded Tuesday at midnight by the heat currents in the air.

* * Signor Bombicci supposes the detonation of meteors to be that of an explosive gas formed during the surface heating of the mass in the atmosphere, and accumulating chiefly in the vacuous space left behind the mass in its very swift flight.

* * One of the most ludicrous errors that ever crept into the press service was recently made in a Pennsylvania town, where a newspaper was informed by telegraph dispatch that hog rule for Ireland was a failure so far as the elections were concerned.

* * A process of separating the tin from scrap or pieces of tin plate or tinned iron by means of hydrochloric acid has been patented by Mr. Wilhelm Husenbach, of Mannheim, Germany. It consists in heating the cuttings or scraps and subjecting them while hot to the action of hydrochloric acid in the form of a dry gas or vapor, distilling off the protochloride of tin and avoiding the necessity of washing the scraps.

* * Mr. Earle H. Gowing, of Reading, Pa., has assigned to the Ashcroft Manufacturing Company, of Boston, a patent for a new indicator piston and attachment. The object of the invention is to eliminate the errors resulting from the momentum of the indicator piston and its attachments, and to provide a simple, cheap and effective means of connecting the piston with its returning spring, and also with the piston-rod.

* * M. Colladon, in a paper to the Academie des Sciences, suggests that the electricity so vividly illustrated by thunderstorms is generated principally by friction of air and water vapor. During a thunderstorm the rain-drops formed in the storm-cloud descend vertically to the earth, causing a partial vacuum, which is replaced by air drawn in laterally and from upper layers. The friction caused by this movement is the principal cause of the generation of electricity.

* * A machine for shearing sheep is said to be in successful operation in Victoria. It is made of brass, in the shape of a small trowel, and is actuated by a turbine wheel, about three inches in diameter, geared into a wheel, on which is fixed a cutter. A comb serves as a guard against cutting the skin. The steam is conveyed from the boiler by an indiarubber tube, which is double, having one inside the other. The inner one is the injection, and the space between the two the ejection.

* * An interesting experiment, showing the influence of electricity on the growth of roots, has been made in Germany by Prof. Hodefieiss. Plates of copper were thrust upright into the earth, and connected by wires with similarly placed zinc plates, about 100 feet distant, an electric battery being thus formed with the earth between the copper and zinc in the circuit. Both potatoes and beets planted between such plates gave an increased yield—beets fifteen per cent., potatoes twenty-five per cent.—as compared with other parts of the same field.

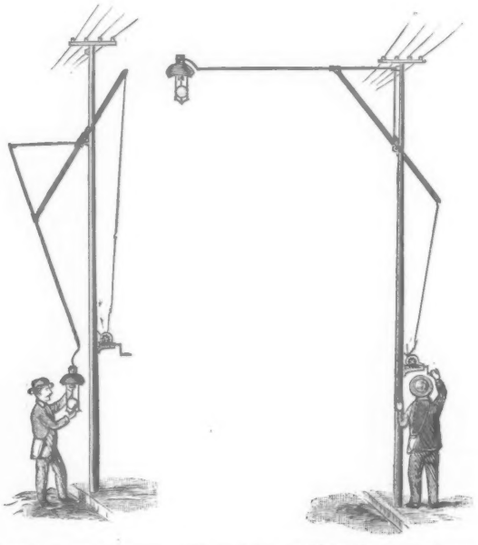
* * Under the slow but continuous action of the sulphurous acid thrown in the air of cities by the combustion of coal and the influence of the frequent changes in the degree of atmospheric humidity, it is found that the peroxide of red lead, used in coloring certain placards, is destroyed and sulphated. At the same time the protoxide of lead thus liberated is transformed into an insoluble sulphite, and this salt, being easily analyzed, it is believed that a certain means is thus obtained for determining the condition of the atmosphere in large cities and its relations to the public health.

The Velocity of Light.

The Cleveland experiments of Professor Michelson indicated the velocity of light to be 299,853 kilometers per second. The Washington experiments of Professor Newcomb, using only results supposed to be nearly free from constant errors, gave 299,860 kilometers per second, a difference of but 7 kilometers, or about 4⅜ miles. These experiments are held by scientists all over the world to be of far superior precision to any others yet executed. No other experiments gave such satisfactory results as those simultaneously carried on by Professor Newcomb at Washington, and by Professor Michelson at the Case School in Cleveland. Professor Newcomb's finally concluded result is that light travels in vacua at the rate of 299,860 kilometers, or 186,327 miles per second, with a possible error not exceeding 30 kilometers, or 19 miles.

The Renehan Mast Arm.

The mast arm, of which two views are given in this page, is built of inch and a half gas or steam pipe. At the extreme end there is a casting of malleable iron, shaped like a pair of horns, with hooks on the ends by which the lamp is suspended. Two pipes, extending on each end of the pole, are fastened to the top pipe, or large lever, by a casting which holds the three pipes very firmly together. These are kept in their places by screws. Four feet back of this connection is a smaller casting for the heel of the pipe to set into to keep it steady. The arm is fastened to the post by castings surrounding the pipes, and pinned to the casting that is fastened to the post. At the end of the lever an iron rod, one half inch thick, is attached, extending down to windlass to which cable is attached. No step-ladder is required, the carbon trimmer handling the mast arm as shown in Figs. 1 and 2. Mr. Jas. J. Renehan, of New Britain, is the inventor.



VIEWS OF THE RENEHAN MAST ARM, OF NEW BRITAIN, CONN.

Imitating Leather Surfaces.

By means of electricity the most attractive leather surfaces are now completely imitated. The leather which it is desired to imitate is first well cleaned and coated with graphite, as in electro-plating a smaller article. It is then placed in a copper bath, the tank of which is large enough to easily receive a skin of any size. A dynamo-electric machine generating a powerful current furnishes the current. The copper is deposited upon the coated surface of the hide to a thickness of one sixteenth to one-eighth of an inch. The plate thus formed reproduces, but reversed, every mark and minute vein of the leather, so that a print taken from it is an exact copy of the original in every detail.

Underground Wires.

Under the above heading, the Boston *Herald* gives its views of the question in a sensible editorial. "The decision," it says, "arrived at by the Commission on Underground Wires in New York to build a subway under the principal streets of that city, into which all of the telegraph, telephone and electric light companies will be compelled to place their wires, will, doubtless, have its effect in determining action in this State, though it would be obviously better to wait until the experiment had been fairly tried, and the expense involved in making it duly determined, before proceeding on our own account to copy the plan. The costs of construction must necessarily be very large, and the annoyance incident to the work will be of no inconsiderable dimensions. The proposition of the New York commission is that this subway shall be built at the public expense, though tolls or rents will be exacted from the companies making use of it. In this way the city government can, no doubt, assure itself of a return upon the investment; but if the rentals charged are large, their imposition may seriously interfere with the general use of these various forms of electrical apparatus. For example, the toll now charged by the telephone companies is looked upon by a great many as exorbitant; but if for each wire that is run a rental has to be paid to the city for the use of the subway, the expense of maintaining telephonic connection may necessarily be placed at a higher figure than that now demanded. There are, no doubt, offsetting advantages, such as the lessened liability to loss caused by the interference of the elements. But this, we fancy, would be but a small proportion of gain to counterbalance a large annual outlay. Then, too, unless these subways were constructed through almost all the streets, it might be difficult to have telephone or electric light wires carried to those places or buildings where their use was required. The problem is a very large one—much larger, we imagine, than most persons have supposed. The popular notion seems to be that all that need be done is to give a general order that on and after a certain date electric wires of all kinds shall be placed underground. But a further consideration of the matter shows that there are not only electrical difficulties to be overcome, which may or not have been solved in the plan of the New York commissioners, but there is also the exceedingly important factor of greater expense, which is one that, in this commercial age, cannot be wisely ignored."

—— The manner in which belting should be applied to pulleys, whether flesh side in contact or hair side in contact, has always been a matter of some diversity of opinion, but by common acceptance it seems that the hair side of a belt is now generally used as the side to come in contact with the pulley. The claim for this arrangement is that a better contact is obtained between pulley and belt. There are many large shops where this is the regular practice, and we are of the opinion that this method of application will in the long run give the best results.

Digest of U. S. Patents on Storage Batteries.

REFERENCES TO FOREIGN PATENT OBTAINED THEREON.

1883.

271,732. Feb. 6, 1883. Filed Sept, 26, 1882.
English pat. No. 3,030, June 28, 1882.
France, June 23, 1882.
Belgium, Sept. 2, 1882.
Charles P. Nezeraux, Paris, France.

There is a number of different inventions described in the specification.

One form of electrode consists of a plate of lead having one surface and its edges covered with ebonite. Upon the uncovered surface is applied a paste of per-oxide of lead (formed by electric action external to the battery) and an alkaline salt mixed with water or per-oxide with water alone. Another form is where an ebonite box having perforated sides is used, and the active material packed in the box with a suitable conductor.

To form the per-oxide used, a battery is constructed wherein the negative material is made by melting lead, and then adding mercury. The mass upon cooling being of the consistency of paste, or by reducing the quantity of mercury added, and making a dry and friable powder amalgami, the paste or powder being arranged in a suitable support.

A process is described for regenerating the powders used in the electrodes, external to the battery. A pocket form of battery is described.

The claims are very limited, and relate by letter only to a part of the various forms shown.

271,880. Feb. 6, 1883. Filed Nov. 22, 1882.
James A. Maloney, Washington, D. C.

The electrodes are formed the negative of plates of black oxide of manganese and the positive of carbon, the electro lyte used is a solution of an ammoniacal salt.

273,492. March 6, 1883. Filed June 26, 1882.
T. A. Edison, Menlo Park, N. J.

Finely divided metallic lead, is obtained by heating an organic salt of lead, or by precipitating finely divided lead by immersing metallic iron or zinc in a solution containing a lead salt—as acetate of lead, or obtained by electrolysis of the acetate of lead, is packed into a suitable vessel, divided into compartments by transverse partitions of insulating material. The finely divided lead of each electrode is extended up at one end and compressed to form a solid lug or terminal.

The claim is for an electrode composed of finely divided metallic lead having compressed portions for connections (terminals.)

273,598. March 6, 1883. Filed Nov. 10, 1882.
William S. Platt, Waterbury, Ct.

This patent, although included in the Government list of secondary batteries, has no connection with the subject.

273,739. March 13, 1883. Filed Sept. 14, 1882
Paul Jablochkoff, Paris, France.
France, June 27, 1882.
English, No. 3,172, July 5, 1882.

The device described is a primary battery, which will act by reversal as a secondary battery.

The electrodes are one of carbon, as the positive element, and the other of sodium, potassium or other metal or substance, which rapidly oxidizes in the open air. No exciting liquid is employed, but alcohol may be added to facilitate the operation of the pile.

273,751. Mar. 13, 1883 Filed June 10, 1882.
Lyman D. McIntosh, Chicago, Ill.

Relates to a terminal for primary or secondary battery plates.

273,855. March 13, 1883. Filed Jan. 31, 1883.
N. S. Keith, N. Y.

The electrodes are formed by the electro-deposition of lead from a solution of the acetate of that salt, and afterwards covered with a bag of fibrous material.

274,082. March 13, 1883. Filed June 9, 1881.
English, July 1, 1882.
France, July 26, 1882.
Italy, Sept. 30, 1882.
Belgium, July 22, 1882.
Charles F. Brush, Cleveland, Ohio.

The battery plates consist of a supporting plate of lead, plain perforated, ribbed or corrugated, upon which is deposited by electrolysis of a lead oxide from an alkaline solution—a coherent layer of lead in contradistinction to a porous layer. Where the plates are of rubber, they are arranged longitudinally in the bath and the lead anode suspended over them. By this means the lead is deposited between the ribs of the cathode.

274,292. March 20, 1883. Filed Aug. 7, 1882.
T. A. Edison, Menlo Park, N. J.

Plain lead plates are used for the electrodes, on which is formed arborescent metallic lead, made by pouring molten lead from a height into water or into powdered chalk or lime, or by blowing air through molten lead.

—— The Charlestown Gas Company, Charlestown, Mass., have decided to put in electric lights, and have ordered dynamos, lamps, etc., from the Brush Electric Light Company, Cleveland, Ohio. They have placed the order for an Armington and Sims Company engine with the Jarvis Engineering Company, of Boston. The boiler will be made by the Cunningham Iron Works, of Charlestown, Mass., and will be set with the Jarvis patent furnace using Sheffield grates to burn coke screenings for fuel.

—— The Pittsburgh *Leader* contains the following: "Prof. Jean Jarentski, of Paris, who has been here examining gas wells, has gone to inspect the magnetic wells of Michigan. The theory upon which he is now at work is that at some depth there may be found a stratum of mineral which is heavily charged with magnetic electricity, which may be brought to the surface and utilized. This theory has received partial confirmation in the existence of magnetic wells in Europe and in this country. As those of Michigan are in a location which could be used, in connection with the power, to build manufactories, an essential which none of the others possess, a syndicate of Frenchmen, believers in the theory, has sent Professor Jarentski here to experiment upon the subtle force. The wells are now flowing water from the depth of 800 feet so highly charged with electricity that a knife blade or steel bar held in the water for a few moments becomes highly magnetized. The waters have become celebrated in the vicinity for their healing power when used for nervous diseases or debility. In connection with their history is the story that while under way the drillers were astonished to find that the string of tools became magnetized, and that a steel line used in measuring the depth became charged, and it was with difficulty that the well was put down to the water. The professor is confident that at some point he can find stratas sufficiently charged to run mills and factories independent of steam or other forces."

—— The Wilkesbarre (Pa.) Electric Light Company has been for some time engaged in enlarging its plant for the purpose of introducing the incandescent system. An 80-foot frontage and a depth of 130 feet will be occupied. The main building will be 80x45 or 50 feet, with a large wing, and the boiler house will be enlarged to contain five large return tubular boilers in addition to the present capacity of four cylinder boilers. A capacity of 4,000 incandescent lights is being provided for, the contract for the apparatus having been let June 3d and the wiring and pole contract to Mr. Marr about the same time. The new plant it is estimated will cost $150,000. The inside wiring of the premises of business places has been in progress for some time, and it is stated that the new lights will be in operation by the middle of September. The contract for the engines and boilers was awarded to the Harrisburg Car Manufacturing Company. Two engines will be used, one a 150 horse-power, Ide automatic, high speed, and the other an 80 horse-power. The present plant of the company has a machinery capacity of 210 arc lights and a dynamo capacity of 126 lights, of which about 115 are in operation. This capacity is not to be increased, the present arrangements contemplating only the introduction of 4,000 incandescent lights, with which business places only will be supplied, though the plant will be subsequently extended so as to provide for the lighting of private houses. The cost of the light to patrons will be about the same as gas.

—— Portsmouth was partly illuminated on the main street, and in a few stores by electric light Saturday night for the first time, the motive power being temporarily supplied by the Portsmouth Machine Company. The Electric Light Company has purchased a five horse-power motor, boiler and engine combined from Chambersburg Pa., which will shortly arrive.

—— The planting of electric light poles along the streets of Easton, Penn., is attended with more than is usual in the circus line. A woman on Fourth street stopped operations for a while by coming out of her house and standing over the hole. After some loud talk, she was pushed aside and work resumed. Another woman on the same street delivered to the men an opinion more forcible than elegant On Wolf street a citizen became so excited that he drove the men away with a butcher knife. A near neighbor filled up the holes; and others in various ways contributed to the general entertainment. Still the work goes on.

—— The Ohio State agency of the Mather Electric Company is flourishing under the management of Mr. W. N. Gray, and among the many plants installed are the 250 incandescent light plant at Heuck's Opera House, and a plant of 150 lights installed at the People's Theatre, in Cincinnati, besides the more recent important incandescent light plant of 300 light at the Cincinnati *Commercial Gazette* building. Mr. Gray's offices are at the Carlisle building, and associated with him in the same building are the Cincinnati agents of the Mather Company, Messrs. Francis and F. S. Ferry. We are pleased to be able to chronicle the gratifying success of a system so excellent.

—— The Fresno (Cal.) Electric Light and Power Company was formally organized and incorporated on Wednesday of last week. The capital stock was fixed at $50,000, and the following officers were elected: President, Firman Church; secretary, A. M. Clark, who will also act as treasurer for the present; directors, A. M. Clark, J. F. Wharton, Firman Church and George Manuel. The company will put a turbine wheel in the Fresno Canal Company's main canal, about eight miles east of town, where the electricity will be generated, and from which point it will be conducted to the city by means of a copper cable. Contracts enough for light have already been made to insure the success of the undertaking.

—— The work of preparing to illuminate the Lachine canal and its basins with the incandescent light is proceeding rapidly and is nearly completed. There will be in this system 160 fifty candle-power incandescent lamps placed about 150 feet apart. The cables will be passed across the canal in four different places so as to convey the electricity and also provide for the return current. There will be three sets of cables to suit the various places—one a nine-conductor cable, another a five-conductor, and the other a single conductor. Two of these will be placed at each crossing, one for carrying the electricity to the lamps and the other for carrying the return current. The motive powers for the dynamos will be the waste water in the Mill street tail race, and a substantial flume has been constructed for the turbines. There will be three 56-inch turbines, which will be placed under a ten-foot head of water, and each of which will give 80 horse-power. There will also be three dynamos, one to light the canal, a second to light the harbor, thus doing away with the expense of the steam engine at present used in this service, and the third a spare one which can be used in case anything might happen to either of the two. The dimensions of the dynamo-house itself is 32 by 36 feet and two stories in height. The lower flat will be used altogether for the driving machinery and the dynamos will be on the upper flat and connected by belting. The machinery is geared by counter shafting, so that 1,400 revolutions a minute can be secured if necessary. The lighting of the harbor will in future be under the management of the canal officials.

—— The Silvey Electric Light and Motor Company, of Cincinnati, Ohio, has been organised to manufacture and install under the patents of W. L. Silvey, who will be remembered as a recently-announced inventor of a method of transmitting messages by induction. The stockholders of the new company are James E. Mooney, of the American Oak Leather Company; John E. Bell, Lane & Bodley, George B. Kerper, S. M. Lamont, Powell Crosley, W. L. Silvey, Geo. M. Roe, and R. W. Criswell. The organization of this company promises a new and important industry for Cincinnati.

—— A curious phenomenon in the combustion of copper and nitrogen has been observed by M. Blondlot and communicated to the French Academy of Sciences. A disk of platinum and a disk of copper 0.03 meter in diameter were fixed vertically in front of each other by means of two platinum stands. The disks were 3 or 4 mm. apart, and both were placed inside a bell jar of porcelain, open below. The apparatus was then heated red hot for three hours by means of a gas furnace, and although there was no electric current, it was found that the face of the platinum disk was blackened with a deposit containing copper and platinum. In short, the copper had crossed from the copper to the platinum plate.

—— The Detroit Council has instructed the Fire Marshal to institute proceedings against all corporations violating the ordinance prohibiting overhead wires. No exception was made of the Dix Road Electric Railway Company, which was lately granted a franchise to erect poles and train wires inside the city limits, and unless the resolution is recalled from the Mayor and amended so as to exclude the railway company, the Fire Marshal will institute proceedings to prevent the stringing of the wires, without which the railway cannot be operated.

—— An official of the St. Louis Gas Company was recently on the witness stand in court in a case of slander. The slander consisted in calling a man an idiot for selling all his gas stock for fear that electricity would break up all the gas companies. "Has electricity interfered with the value of your stock?" was asked. "To a slight extent." "If you were to lose half your patrons, would your stock still pay a dividend?" "Certainly, sir. We should simply increase the bills of the other half to make up the deficit."

—— At Jacksonville, Fla., the Citizens' Gas Company have already made material additions to the electric light plant purchased of the American Electric Manufacturing Company in May. They are now running about fifty 2,000 candle arc lamps and 200 "Municipal" lamps of 10, 16 and 32 candle-power. A part of these are in the office of the *Florida Times Union*, and give the greatest satisfaction. The young and energetic manager of the gas company, Mr. A. D. Stevens, was in great measure prepared for assuming charge of this new department of his work by an electrical course at the Worcester (Mass.) institute of technology, where he graduated in 1884.

—— Attention has recently been called in the western portion of this State to the excellent street illumination afforded by the American arc system in the hands of the American illuminating Company of Hornellsville, N. Y. Their capacity was at first 70 lights, but has been increased the past month to 105 lamps, and a prospect is now open of a substantial addition to business in the placing of a considerable number of incandescent lamps on the arc circuits at points too remote from the station to be economically reached by a low current. These lamps may be of any desired candle-power, and controlled in clusters or groups of three by devices arranged by the American Company. Numbers of stores and hotels are now finely lighted by 2,000-candle lamps of marked steadiness. The officers of the Hornellsville company are the following: John M. Finch, President; Floyd F. McConnell, Vice-President; Hon. J. E. R. Santee, Treasurer; Luther T. Mason, Manager.

ELECTRIC LIGHT NEWS

—— The Providence city government has awarded the electric lighting contracts to the Narragansett and Rhode Island companies.

—— The Yonkers, N. Y., Company has started its station with subscribers for 70 arc-lights for commercial lighting. The Schuyler system is used.

—— The Rutland (Vt.) Electric Light Company will buy at once a 125-horse power high-speed engine, and expects to have the lights in operation inside of four weeks.

—— The Waltham Electric Light Company, of Waltham, Mass., has been incorporated with a capital stock of $20,000. Charles C. Bills and others, incorporators.

—— The Beaver Dam Electric Light Company, of Beaver Dam, Wis., has been incorporated. Capital stock, $15,000. Geo. B. Congdon and others, incorporators.

—— Mr. J. Cooper Cloud, of Philadelphia, formerly with the Thomson-Houston Company, is now assistant manager of the Philadelphia branch of the Schuyler Electric Light Company.

—— Mr. Curt W. Meyer, manufacturing electrician of this city, has issued a new and complete illustrated catalogue, containing much valuable information in regard to his special branch of electro-medical and scientific instruments.

—— At the last meeting of the township committee of Millham, N. J., it was decided that when the contract with the gas company expires in March next, five electric lights will be placed on Clinton street from the city line to the Star Rubber Works.

—— The Schuyler Company has recently started a plant at Bay Ridge, Md. Everything is working admirably. Twenty-five arcs are in use, and forty incandescents in series without distributors.

—— The Jarvis Engineering Company, Boston, Mass., have received the order for two Armington & Sims Company engines, to run a plant of incandescent lights in the new building now being completed by the *Globe* on Washington street, Boston.

—— Hood, Bonbright & Co., Philadelphia, wholesale dry goods, intend to put in an electric light plant for their large new building, corner of 11th and Market street About 100 arc lights and 500 incandescent lights will be required.

—— The Gas Committee of Toledo (Ohio) Council has approved the ordinance to illuminate Collingwood avenue with electric lights. Already the poles and wires are being set, and in a few days the festive burglar will bid a lasting farewell to Collingwood avenue.

—— A fire in the Brush Electric Light Works, Detroit, last week damaged the building to the extent of $500, covered by insurance. A brick wall separates the boiler room from the works, which escaped damage. The cause of the fire is attributed to the overheating of the boilers.

—— The Electric Light Company, Bristol, Ct., has decided to establish a plant of its own, and to erect a building, 30x40. A sixty horse-power boiler and a fifty horse engine will be put in to furnish power, and another arc-dynamo, the same as the one now in use, will be added to the present plant.

—— The Indianapolis *News* building is lighted by electricity. The installation is by the Jenney Company of that city. At the main entrance, over every desk in the counting room and the editorial department, over every case and stand in the composing room, in the press, stereotyping and mailing rooms and hallways, and suspended from every gas fixture in the building, are the little globular lamps of the incandescent system of this company.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 13, 1886.

345,292 Electric clock; Richard E. Fenner, Chicago, Ill., assignor of one-half to Charles K. Giles, same place.

345,325 Telephone exchange switch; Charles E. Scribner, Chicago, Ill., assignor to Western Electric Co., same place.

345,326 Test plug for multiple switchboards; Charles E. Scribner, Chicago, Ill., assignor to the Western Electric Co., same place.

345,334 Electro-magnetic motor; Elihu Thomson, Lynn, Mass.

345,335 Socket for incandescent lamps; Elihu Thomson, Lynn, Mass.

345,336 Commutator brush; Elihu Thomson, Lynn, Mass.

345,383 Electro-magnetic apparatus for separating ores; Heinrich P. J. Kessler, Ober Lahnstein, Prussia, Germany.

345,561 Regulator for electric circuits; Merle J. Wightman, Hartford, Conn., assignor to the Schuyler Electric Light Co.

345,642 Electric railway signal; Malcom W. Long, Hyde Park, Mass.

345,658 Telephone transmitter; James P. Young, Philadelphia, Pa., assignor of one-half to John B. Dallas, same place.

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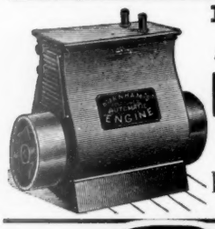
A. C. FOWLER, C.E., was Examiner in the U. S. Patent Office from 1880 to 1886, in the Interference and Electrical Divisions.



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SPECIAL NOTICE.

National Electric Light Association,

SEMI-ANNUAL MEETING.

THE FOURTH MEETING—semi-annual—of the NATIONAL ELECTRIC LIGHT ASSOCIATION will be held at DETROIT, MICH., on Tuesday, 31st day of August, at 10 o'clock, A.M. Dues being payable in advance, all members are required to forward the same for the year 1886, by check or otherwise, payable to the order of J. F. MORRISON, President, Baltimore, Md.

Electric Light Companies and Manufacturers of Electric Light Apparatus, Supplies, &c., desiring to become members, must apply on or before August 31st, to the President, J. F. MORRISON, Baltimore, Md.

Members and others desiring information as to R.R. transportation rates will address J. F. NOONAN, Esq., Chairman Com. on Transportation, Paterson, N.J.

Special Hotel rates will be made known previous to meeting of the Association.

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Fig.259

PHOENIX GLASS COMPANY,
(Works, Water Cure, Beaver County, Penn.)

Fig.255

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Fig.260

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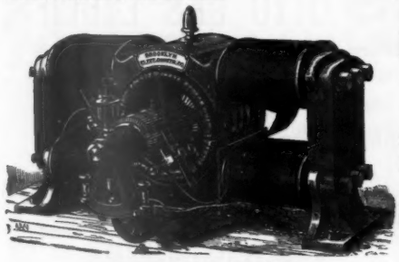

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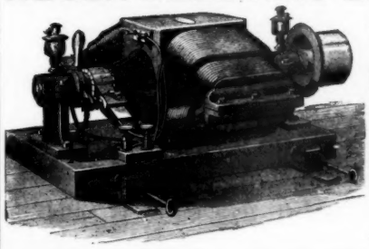

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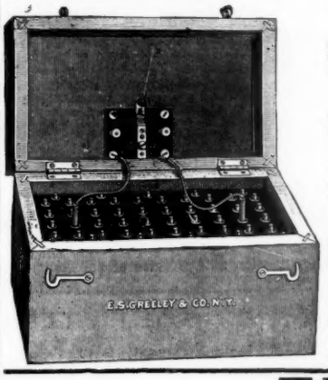

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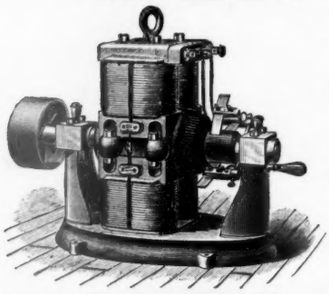

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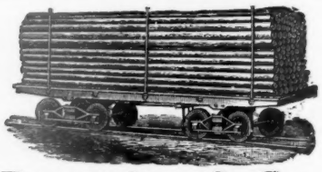

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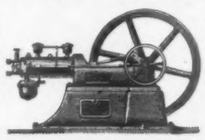

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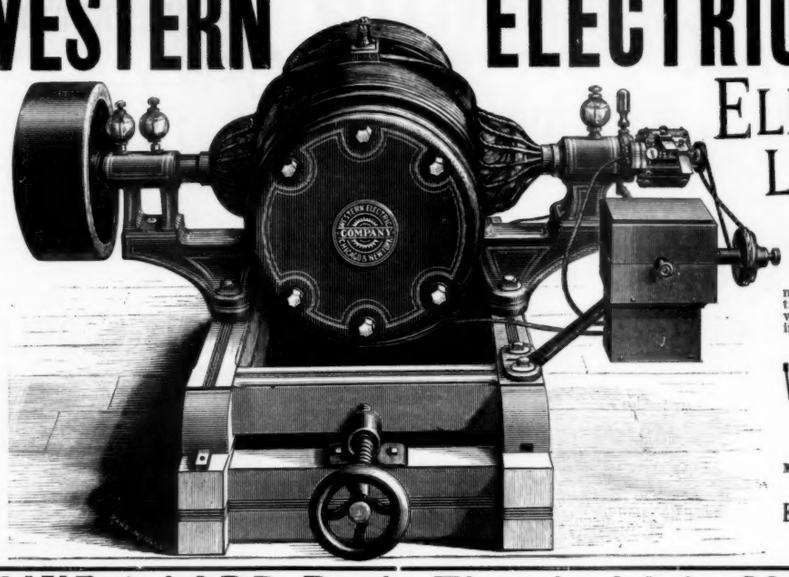

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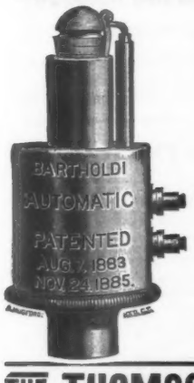

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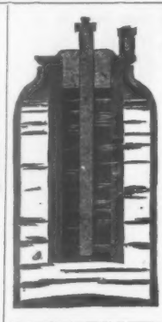

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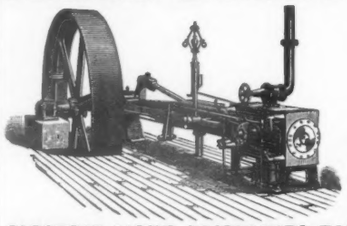

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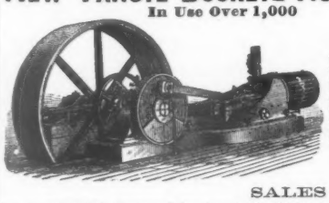

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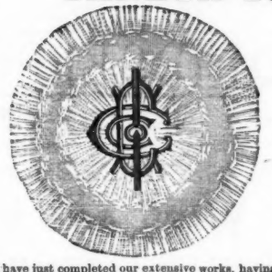

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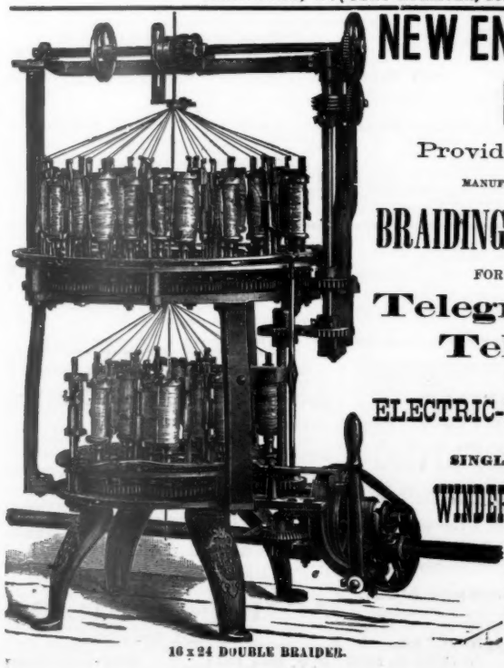

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Any number of the lamps can be turned on or off without affecting the rest.

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